MARINE PROTECTED AREAS

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON FISHERIES CONSERVATION, WILDLIFE AND OCEANS

OF THE

COMMITTEE ON RESOURCES
U.S. HOUSE OF REPRESENTATIVES

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C O N T E N T S

OVERSIGHT HEARING ON THE USE OF MARINE PROTECTED AREAS AS A FISHERIES MANAGEMENT TOOL

Thursday, May 23, 2002
U.S. House of Representatives
Subcommittee on Fisheries Conservation, Wildlife and Oceans
Committee on Resources
Washington, DC

The Subcommittee met, pursuant to call, at 11:39 a.m., in room 1334, Longworth House Office Building, Hon. Wayne Gilchrest [Chairman of the Subcommittee] presiding.

STATEMENT OF HON. WAYNE GILCHREST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MARYLAND

Mr. GILCHREST. The Subcommittee will come to order.

I would like to welcome our witnesses today. As most of you know, the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act has been one of the top priorities of the Subcommittee during the 107th Congress, and we have just finished a Subcommittee markup of H.R. 4749, the Magnuson Stevens Act Amendments of 2002. I appreciate the witnesses' patience as we worked through the markup process prior to the start of this hearing.

Today's hearing is focused on the use of Marine Protected Areas as a fishery management tool, as a means to protect and restore ecosystem function, and as a research tool. I believe it is of fundamental importance that we continue our recent progress to prevent overfishing, rebuild overfished stocks, reduce bycatch, and protect essential fish habitats. All of these actions represent important steps toward implementing a comprehensive, ecosystem-based fishery management strategy for the United States. I believe that there is a strong scientific basis for using Marine Protected Areas as one of the fishery management tools to accomplish these objectives and to implement ecosystem-based fishery management. MPAs represent one way to ensure that we are only withdrawing the interest and not the principal from our marine resource bank accounts.

However, I also recognize that some MPA proposals may raise significant controversy, especially provisions for establishing no-take reserves, where removal or disturbance of all fishery and other resources is prohibited. We need to keep in mind that no-take

reserves have a legitimate place within a broad strategy to conserve ocean resources and that the process of establishing such reserves must be based on sound science and must include participation from the full range of affected stakeholders.

MPAs represent a tool that can be used to benefit the public, the marine ecosystem, the commercial fishermen, the recreational fishermen and anybody who has an interest in the nation's and the world's oceans. We will pursue this effort in the way that we pursue other things, with the best available information at our disposal and in a process that will include everybody.

I will now yield to my good friend to withdraw his statement—I mean, to give his statement—

[Laughter.]

Mr. GILCHREST. Thank you, Mr. Underwood.

[The prepared statement of Mr. Gilchrest follows:]

Statement of The Honorable Wayne Gilchrest, Chairman, Subcommittee on Fisheries Conservation, Wildlife and Oceans

I would like to welcome our witnesses today. As most of you know, the reauthorization of the Magnuson–Stevens Fishery Conservation and Management Act has been one of the top priorities of the Subcommittee during the 107th Congress, and we have just finished a Subcommittee mark-up on H.R. 4749, the Magnuson–Stevens Act Amendments of 2002. I appreciate the witnesses patience as we worked through the mark-up process prior to the start of this hearing.

Today's hearing is focused on the use of marine protected areas as a fishery management tool, as a means to protect and restore ecosystem function, and as a research tool. I believe it is of fundamental importance that we continue our recent progress to prevent overfishing, rebuild overfished stocks, reduce bycatch, and protect essential fish habitats. All these actions represent important steps towards implementing a comprehensive, ecosystem-based fishery management strategy for the United States. I believe that there is a strong scientific basis for using marine protected areas as one of the fishery management tools to accomplish these objectives and to implement ecosystem-based fishery management. MPAs represent one way to ensure that we're only withdrawing the interest and not the principle from our marine resource bank accounts.

However, I also recognize that some MPA proposals may raise significant controversy, especially provisions for establishing no-take reserves, where removal or disturbance of all fishery and other resources is prohibited. We need to keep in mind that no-take reserves have a legitimate place within a broad strategy to conserve ocean resources, and that the process of establishing such reserves must be based on sound science and must include participation from the full range of affected stakeholders

I look forward to the testimony of the witnesses and hope that we can have a constructive discussion that will continue to move us toward better management of the Nation's marine resources.

STATEMENT OF HON. ROBERT UNDERWOOD, A DELEGATE IN CONGRESS FROM THE TERRITORY OF GUAM

Mr. UNDERWOOD. Thank you, Mr. Chairman. I ask unanimous consent to enter my full statement into the record, and I want to thank you for holding this hearing. And as you have outlined, Marine Protected Areas are a controversial issue in many communities.

I am very gratified that you have scheduled this morning's hearing to discuss the concept and application of MPAs. In my home island of Guam, we have set aside a significant portion of territorial waters as MPA areas, and I am very pleased that Mr. Gerry Davis, Guam's Acting Chief of Aquatic and Wildlife Resources, could be with us today to relay the experience that we have had

with MPAs and to speak to the practical benefits of MPAs as a resource management tool.

I recognize that not everybody thinks it is a good idea, and some question whether they are scientifically valid, and I think that is the crux of the issue. I think there is an intersection of many considerations here: certainly, the residents who live in the areas affected; the need to continue to support both commercial and recreational fishing; as well as trying to understand the science of the issue, and I think that would be very informative and hopefully would provide guidance for the Subcommittee as we continue our work in this.

I am also very pleased to see that our first witness is a distinguished friend and colleague from Minnesota.

[The prepared statement of Mr. Underwood follows:]

Statement of The Honorable Robert A. Underwood, a Delegate in Congress from Guam

Thank you, Mr. Chairman. We are at an important crossroad as we attempt to balance the needs of a growing human population with the physical and ecological limits of the ocean environment.

Reports of depleted fisheries, habitat degradation, and loss of marine biodiversity continue unabated. Ever more frequently the failures of resource managers to protect the ocean environment wind up in protracted legal proceedings that are expensive and often inconclusive.

The need to find new strategies to manage ocean resources has never been more apparent. The risk of inaction has never been as great. That is the challenge before us. That is also why I am gratified that Chairman Gilchrest has scheduled this morning's hearing to discuss the concept and application of marine protected areas.

Guam has set aside a significant portion of its territorial waters as marine protected areas. I am extremely pleased that Mr. Gerry Davis, Guam's Acting Chief of Aquatic and Wildlife Resources, could be with us to relay Guam's experience with MPAs and to speak to the practical benefits of MPAs as a resource management tool.

I realize that not everyone believes that MPAs and marine reserves are good ideas. Some question whether they are scientifically valid. Certainly it is reasonable, if not expected, for a new scientific concept to come under the harsh rigor of genuine peer review.

But I must say that I find the heated rhetoric and criticism of MPAs by those individuals opposed to the concept to be nothing short of self-serving and bordering on paranoia. Contrary to their assertions, no one is suggesting that MPAs should replace all traditional fisheries management practices. No one is boasting that MPAs will solve all environmental threats confronting marine life. And no one is proposing that MPAs be imposed anywhere and everywhere.

Less than one percent of U.S. territorial waters, and less than one percent of the world's oceans, are currently placed in marine reserves and therefore completely protected from all extractive human uses. The reality is that the use of MPAs is still in its nascency.

Nevertheless, an impressive empirical record is emerging which verifies the success of MPAs in restoring biodiversity, increasing productivity, and sustaining ecological function. Numerous examples can be found in coastal regions around the U.S., such as the Florida Keys, or abroad in other nations such as New Zealand and Australia.

Polling data from 2001 also indicates that opponents of MPAs are out of step with a sizable majority of Americans. According to these surveys, almost 65 percent of all Americans support setting aside some ocean areas from all human activities, even recreational activities. And 83 percent of poll respondents supported President Clinton's Executive Order which called for setting aside 20 percent of the U.S. EEZ as marine protected areas.

I note in closing that the concept of MPAs must have some legitimate scientific merit. After all, over 150 marine scientists risked their professional credibility when they endorsed a 1999 consensus statement which verified the scientific basis for MPAs and strongly promoted the establishment of networks of protected areas.

My belief is that we have turned the corner to embark on a new path. Dr. Jane Lubchenco perhaps said it best when she stated that, "it is no longer a question of whether to set aside fully protected areas, but where to establish them."

I say that we should get on with this important work. MPAs offer a new opportunity to enhance our abilities to adaptively manage and conserve ocean resources, and I look forward to this morning's discussion. Thank you.

Mr. GILCHREST. Thank you, Mr. Underwood.

Welcome, Mr. Peterson. You may begin.

STATEMENT OF HON. COLLIN PETERSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

Mr. PETERSON. Thank you, Mr. Chairman and distinguished Ranking Member Underwood. We appreciate the chance to come before you today and testify before your esteemed Committee regarding the Marine Protected Areas.

As a leader of the Congressional Sportsmen's Caucus, I recently introduced H.R. 3547, known as the Freedom to Fish Act, which is a bill that provides reasonable and responsible guidelines for the use of Marine Protected Areas as a fishery management tool. It requires the involvement of the public in the development of these areas and ensures that recreational fishing will only be curtailed as a last resort.

For a long time, fishermen have supported temporary closed fishing seasons to allow fish populations to grow to optimum size. However, at the end of the closed season, fishermen rightfully expect these areas to be reopened in order to enjoy the benefit of their conservation efforts. When fishermen have a voice in the decisionmaking process, they can more readily support the conservation efforts being made.

The present rhetoric about marine reserves differs substantially from this tradition of involving recreational fishermen. Some advocates of marine reserves intend to close vast portions of the ocean to all forms of fishing on a permanent basis, including catch and release fishing that is now becoming practiced by an increasing number of Americans. They want these massive areas declared off-limits to fishing without scientific proof that permanent, no-fishing zones would actually produce more fish.

To put it simply, the marine reserve movement seeks to exclude the American public from a public resource without scientific justification for doing so and without any input from recreational fishermen who use it. In addition, depending on the size of the areas to be closed, there could be significant adverse environmental effects by forcing fishermen from their historic fishing grounds and into other areas.

My Freedom to Fish Act would not prevent the Federal Government from adopting any permanent no-fishing zones but would ensure that fishermen would be actively involved in the decisionmaking process and that no areas would become a Federal marine reserve unless traditional fishery management programs could not provide for the conservation of the resource. H.R. 3547 would also provide that each and every marine reserve would be subject to review every 3 years, and based on those reviews, these no-fishing zones will be reopened whenever they fail to demonstrate positive

benefits for the fishing public's enjoyment of our nation's fishery resources.

Mr. Chairman, I appreciate the chance to visit with you, and we would be pleased to answer any questions that you or any other member of the Committee would have at this time, and again, thank you for the opportunity.

[The prepared statement of Mr. Peterson follows:]

Statement of The Honorable Collin C. Peterson, a Representative in Congress from the State of Minnesota

The CHAIRMAN. Thank you for allowing me to testify before your subcommittee regarding Marine Protected Areas. As a leader of the Congressional Sportsmen's Caucus, I recently introduced H.R. 3547, known as the Freedom to Fish Act, which is a bill that provides reasonable and responsible guidelines for the use of marine protected areas as a fishery management tool. It requires the involvement of the public in the development of these areas and ensures that recreational fishing will only be curtailed as a last resort.

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The present rhetoric about marine reserves differs substantially from this tradition of involving recreational fisherman. Some advocates of marine reserves intend to close vast portions of the ocean to all forms of fishing on a permanent basis, including catch and release fishing that is now being practiced by an increasing number of Americans.

They want these massive areas declared off-limits to fishing without scientific proof that permanent no-fishing zones would actually produce more fish. To put it simply, the marine reserve movement seeks to exclude the American public from a public resource without scientific justification for doing so and without any input from the recreational fisherman who use it.

In addition, depending on the size of the areas to be closed, there could be significant adverse environmental effects by forcing fishermen from their historic fishing grounds and into other areas.

My Freedom to Fish Act would not prevent the Federal Government from adopting any permanent no-fishing zones, but would ensure that fishermen would be actively involved in the decision-making process and that no areas would become a Federal marine reserve unless traditional fishery management programs could not provide for the conservation of the resource. H.R. 3547 would also provide that each and every marine reserve would be subject to review every three years and, based on those reviews, these no-fishing zones will be reopened whenever they fail to demonstrate positive benefits for the fishing public's enjoyment of our Nation's fishery resources.

Mr. Chairman, I would be pleased to answer any questions that you or any other member of the subcommittee may have at this time. Thank you.

Mr. GILCHREST. Thank you, Mr. Peterson.

We will look forward to working with your group and other members as we pursue a better understanding of Marine Protected Areas, where they should be, how they should work and all of the variables. It is an issue that I think is vital; it is important; it is timely, and it will be successful only if all of us work together to develop that policy.

Mr. Underwood?

Mr. UNDERWOOD. Thank you very much for your testimony. You know, coming from Guam and seeing fish—I could never understand the concept of catch and release.

[Laughter.]

Mr. UNDERWOOD. And I see it, and I hear people talk about it, and I just do not understand that, you know, there is no viable end

to the fishing. I just—but thank you very much for your testimony, and thank you very much for your legislation, and we will certainly consider that and take it into account as we continue to work on this issue.

Mr. PETERSON. Well, Mr. Chairman and Mr. Underwood, we would be happy to host both of you in Minnesota and show you why it is we do catch and release. You know, in the freshwater area, we had a real problem with overfishing and taking too many fish out of our lakes, and it really did have an impact. We really do not have commercial fishing many places, but the overfishing on sport fishing really caused problems for the resort industry, and, you know, we had less fishermen coming to the state, so we adopted these catch and release.

I was chairman of the Game and Fish Committee in the Minnesota Senate for 10 years, and we adopted a lot of innovative regulations, and it really made a huge difference. We have a lot bigger fish; we have a lot more fish, and we have many, many fishermen now that will only keep one or two fish, enough to have shore lunch or whatever, and, you know, they do not take home a whole cooler full of fish, and it has really made a big difference.

So, you know, whether that would work in the ocean, I do not know, but it works in Minnesota, and we would be happy to have you come up and sample how great the fishing is up there.

Mr. UNDERWOOD. Well, thank you very much. I will go when it is warm.

[Laughter.]

Mr. GILCHREST. I would like to go ice fishing sometime there, Mr. Peterson.

Mr. PETERSON. We can do that. I have an ice house every year that is about 30 yards in front of my house. I live on a lake, and we catch a lot of fish. So you let me know, and we will do it.

Mr. GILCHREST. We will come up and use your ingenuity and innovative ways to adopt a better policy.

Mr. PETERSON. OK; great.

Mr. GILCHREST. Thank you very much.

Mr. GILCHREST. Our second panel is Mr. Tim Keeney, Deputy Assistant Secretary for Oceans and Atmosphere, U.S. Department of Commerce; Ms. Rebecca Watson, Assistant Secretary for Land and Minerals Management, U.S. Department of the Interior.

Is Mr. Keeney here? Oh, there is Mr. Keeney; OK, and Ms. Watson? There is some question whether you are Ms. Rebecca Watson.

Ms. MORRISON. I am not.

Mr. GILCHREST. You are not? So you are here in lieu of Rebecca? And Ms. Morrison?

Ms. MORRISON. I am the Deputy Assistant Secretary for Land and Minerals Management.

Mr. GILCHREST. Thank you very much for coming.

I have a new panel list. And Ms. Morrison, when you are ready, ma'am, thank you very much for coming. Do you need a little more time to get your papers in order?

Ms. MORRISON. No, sir, I am ready.

Mr. GILCHREST. OK; thank you very much. You may begin.

STATEMENT OF PATRICIA E. MORRISON, DEPUTY ASSISTANT SECRETARY, LAND AND MINERALS MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR

Ms. MORRISON. Mr. Chairman, I wanted to first introduce myself since there was some confusion. I am Patricia Morrison, the Deputy Assistant Secretary for Land and Minerals Management for the Department of the Interior, and I am here today to testify on behalf of the Department of the Interior on the implementation of Executive Order 13158, the Marine Protected Areas.

I would like to thank you first for allowing the Department of the Interior to come and to testify about this important issue and would ask at this time if I could introduce and have my written testimony included in the record.

Mr. GILCHREST. Without objection, so ordered. And I have to say something else that I forgot to say about 45 minutes ago. I ask unanimous consent to insert Mr. Young's statement into the record for the markup, if that could be done, OK? Thank you.

Mr. UNDERWOOD. I will not object.

Mr. GILCHREST. Thank you very much.

[Laughter.]

Mr. GILCHREST. Ms. Morrison?

Ms. MORRISON. Thank you.

Mr. GILCHREST. Hold on. One other correction. Mr. Young's statement is for this hearing, not the markup, OK, fellows? Thanks. Two canoeists down there at the end of the table. Thank you.

[The prepared statement of Mr. Young follows:]

Statement of The Honorable Don Young, a Representative in Congress from the State of Alaska

Mr. Chairman, I appreciate you holding this hearing today and hope that it will serve as the beginning of some rational thought on the issue of Marine Protected Areas (MPAs).

As all of you know, the Clinton Administration issued an Executive Order on Marine Protected Areas. I had a number of problems with the Executive Order and have let my feelings be known to the new Administration.

I did not, as some of you may suspect, call for the elimination of the Executive Order; however, I do think it has some fatal flaws that will keep stakeholders from ever joining this effort.

Fishermen—both commercial and recreational—are one of the most affected and most important stakeholder groups that need to understand and support these MPAs if they are to work. At this point, I see little if any attempt to bring them into the picture. In fact, I see the opposite. Let me give you a few examples:

1) Proponents of the MPA idea have rallied around the idea that MPAs can be beneficial to fisheries conservation and management. Fishermen are told that MPAs will eventually result in more sustained, constant harvest levels. At the same time they are told this, some in the environmental community are telling them that they cannot have any access to these areas and the areas need to be vast and connected in order to be effective. We are also told that these areas must also be permanent. I'm not sure I understand the need for these restrictions.

Regional Fishery Management Councils have used the current authority under the Magnuson–Stevens Act to establish areas that are either no fishing areas, or seasonal time/area closures to protect habitat or to minimize bycatch during important times of the year. These closures are being used to increase productivity of certain species and are the right step for Councils to take—in some cases—for fisheries conservation and management. However, because they are not permanent and yearround, the Clinton Administration told us they were not considered marine protected areas—that only permanent closure could be considered good for fisheries conservation and management.

This is the same Administration that declared that the Klondike Gold Rush National Historic Park was a marine protected area. I'd like to know how an inland

National Park is a marine protected area. This is one area of the Executive Order that needs some serious attention. The definition of "marine" that was used when developing the Executive Order was ridiculous and needs to be fixed.

2) The Dry Tortugas example—This example has been hailed as a wonderful example of the public process at work. I disagree.

The draft plan for the reserve included a large "no-take" area that was labeled a "fishery replenishment zone." Boy, that sounds good. But when fishermen asked how the zone was developed and how the resulting "fish replenishment" would be monitored, the drafters of the plan realized they had made a mistake and couldn't answer the questions. So what did they do? They changed the name to "ecological research reserve". Same result—no fishing—but the lesson of the exercise was that the drafters of the plan had a preconceived notion of what they wanted and it didn't include fishermen. Is this a way to get stakeholder input and involvement?

3) A number of National Marine Sanctuaries have been established around the country with a public process that is required under statute and that included significant public input. Now that some of these Sanctuaries are being reviewed, there is a move to close them to all extractive uses. This seems to me, and to a number of fishing groups, as a type of bait-and-switch. Let's get fishermen to be involved in the process to create a sanctuary which allows them continued access and then when we review the plan, lets kick them all out. Why not? We've got them on record supporting the Sanctuary, so we can kick them out and they can't fuss too much. Maybe I'm being too cynical, but it certainly seems that people really feel that way. Is this the way to get support for the National Marine Sanctuary Program?

4) What are MPAs? This is a question that is the real cause of the frustration that fishermen have shown. Are all MPAs no-take zones? Do they allow limited access by fishermen? What is their purpose? How will we know if they are working? If they are permanent, how can they be changed if conditions change? Some in the environmental community want these areas to be a huge interconnected belt around the U.S. that prohibits access by fishermen permanently.

Here is a quote from an e-mail that my staff received, "It seems logical, to some at least, that we should place no-take reserves in places where there historically has been fishing pressure (the theory being that if that area has supported fishing pressure for several years, it must be an important habitat for that species being targeted)."

If you follow this train of thought to its conclusion, the idea is: to protect fisheries for fishermen, you need to protect the areas that are important to fish. To protect the areas important to fish, find out what those areas are. To find out where the fish are, follow the fishermen. Then close the areas where fishermen fish and that will protect the fish and will benefit the fishermen. Is that what we are doing? Close the fishing grounds to help fishermen? And people wonder why fishermen are reluctant to embrace the idea of MPAs?

If we are going to move forward with MPAs, we need to do a couple of things. First, we need to agree on terminology. If MPAs are not necessarily "no-take" zones, then people need to stop equating the two.

Secondly, we need to realize that all MPAs are not the same and should not be managed the same manner. The Thunder Bay National Marine Sanctuary was established to protect historical shipwrecks not protect fisheries. It should not be managed in the same manner as the Red King Crab Savings Area in the Bering Sea.

Thirdly, we need to realize that there are existing statutory authorities for MPAs and they should be used. We do not need a new set of laws, regulations, Executive Orders, etc.

If we are to use MPAs as a fisheries management tool, there needs to be significant participation by the fishing community in the development of the goals and design of the MPA. The MPA needs to have achievable goals and the success in achieving the goals needs to be monitored and quantified. If the goals aren't being met, then the stakeholders may want to rethink the MPA. The MPAs may need to be fluid. Ocean conditions and habitat conditions change. If an MPA is established for fisheries management, it may need to change as those conditions change. MPAs do not necessarily need to be permanent for fisheries management. Depending on the goal of the MPA, a time/area closure or a seasonal restriction may be all that is needed. Current law allows this type of closure and many Regional Fishery Management Councils are already using them. Finally, the Councils are the appropriate place for these discussions to take place. If MPAs are to be established to help fisheries and they are being done to restrict fishing in specific areas, the Councils are the appropriate, and only appropriate place, for these MPAs to be developed and implemented.

Mr. Chairman, I thank you for holding this hearing and look forward to working with the new Administration to redraft the Executive Order to make it workable and acceptable to the fishing community.

Ms. MORRISON. Thank you, Mr. Chairman. At this time, I would like to simply summarize my testimony and perhaps just hit the highlights of what the Department of the Interior's position is on this particular Executive Order.

America's marine environment contains some of the vital, important fisheries, wildlife and natural resources that provide much of the fuel and food for all of its citizens in this country. It supports the recreational activities for millions of Americans, and it provides routes for domestic and international commerce that are critical to our security and economic well-being.

We believe at the Department of the Interior that each of these uses is important to this country. Everyone benefits from the healthy and well-managed marine resources, and the Executive Order seems to the Department of the Interior an important part of achieving these goals.

We view the Executive Order as an opportunity to focus on the attention of existing protected sites and, as necessary, set aside discrete areas which have a special natural or cultural resource or areas which have potential to provide a continuing basis for environmentally and economically sustainable use of the marine environment. This Executive Order provides the necessary framework for the development of a scientifically based, comprehensive national system of MPAs or Marine Protected Areas.

It requires the analysis of the effects of managing or creating MPAs on social and economic systems while, at the same time, protecting the special natural and cultural resource values associated with these areas. We strongly agree with these premises and further believe that decisions involving MPAs should be made on the basis of the best available science with a full public review and with full public comment.

The Department of the Interior has several diverse areas of interest in this Executive Order through its bureaus: the National Park Service, the U.S. Fish and Wildlife Service as well as the Bureau of Land Management. In addition, through the Minerals Management Service, the Department manages the outer continental shelf for environmentally sound production of oil, natural gas and other minerals. The OCS currently provides approximately one quarter of the oil and natural gas produced in the United States. Finally, the Minerals Management Service and the U.S. Geological Survey conduct significant programs of marine research in support of our programs to manage and conserve the areas of the Department's jurisdiction.

We at the Department of the Interior strongly support the basic premise of the Executive Order that Marine Protected Areas not only provide lasting protection for valuable resources but that they also support the environmentally and economically sustainable use of these marine environments. As you may know, the Department has considerable experience with both of these concepts, which we believe are not necessarily mutually exclusive.

In our review of the Executive Order, the Department has identified several principles which should guide us in our future activities. First, the Department believes that this order appropriately recognizes the adequacy of existing authorities and provides no new authorities for MPAs. We believe that the existing authorities are sufficient for the Department to carry out the mandate of Executive Order 13158 effectively and that those authorities should be the cornerstone of the Marine Protected Areas.

Second, we believe that any actions by the Federal Government regarding MPAs must fully involve the people for which they are effected. We understand and appreciate the important role of public input through communication and collaboration with the Department in our decisionmaking.

Third, the Department of the Interior believes that the Marine Protected Areas Advisory Committee is an extremely important tool for both the Secretary of Interior and the Secretary of Commerce. We believe that it is critical that this Committee adequately be represented by all of the interests of the marine user groups that may be affected by MPA designations and management regimes.

The Department of the Interior and Department of Commerce have already begun to inventory Federally managed marine sites, and we are in the process of initiating the inventory of marine sites that States, localities, tribes, and other territories have set aside for the protection of one or more natural or cultural resources in the marine areas. This is our first step in the deliberative and careful process that we are undertaking. At the end of this inventory, these sites managed by Federal agencies, must determined whether or not they are truly Marine Protected Areas, a process that highlights the importance of clear criteria and public involvement.

Mr. Chairman, we believe that the Marine Protected Area Executive Order gives all Americans with an interest in the marine environment an opportunity to participate in managing it for the present and, more importantly, in the future. We must ensure that all of the interests are represented in these deliberations, and we must bring the best available science to this process. Finally, we must remember that these areas have a purpose and that that purpose is scientifically based protection of marine life; conservation of important submerged cultural and natural resources; and ecological and economical sustainable use of the marine environment for future generations.

If we can successfully merge all of those requirements, we will develop a system that serves all Americans well.

Thank you for your time, Mr. Chairman, and allowing the Department to testify.

[The prepared statement of Ms. Morrison follows:]

Statement of Patricia E. Morrison, Deputy Assistant Secretary, Land and Minerals Management, U.S. Department of the Interior

Mr. Chairman, I thank you for the opportunity to appear before you today to discuss the Department of the Interior's views on the implementation of Executive Order 13158, Marine Protected Areas.

America's marine environment contains vitally important fisheries, wildlife, as well as natural resources that provide food and fuel for all of its citizens. It supports recreational activities for millions of Americans. It provides routes for domestic and international commerce that are critical to our security and economic well being.

Each of these uses is important to this country. Everyone benefits from healthy and well-managed marine resources, and the Executive Order is an important part of achieving these policy goals. We view the Executive Order as an opportunity to focus attention on existing protected sites and, as necessary, set aside discrete areas which have special natural or cultural resources or areas which have the potential to provide a continuing basis for environmentally and economically sustainable use of the marine environment. The Executive Order provides the necessary framework for the development of a scientifically based, comprehensive national system of MPA's, representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources. It requires the analysis of the effects of managing or creating Marine Protected Areas on social and economic systems while protecting the special natural and cultural resource values associated with these areas. We strongly agree with these premises. Further, we believe that decisions regarding MPAs should be made on the basis of the best available science and with full public review.

The Department of the Interior has several diverse interests in Executive Order 13158. Through the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), and most recently the Bureau of Land Management, the Department manages hundreds of marine areas reserved to provide lasting protection for their important fisheries, precious wildlife, and natural and cultural resources. In fact, the USFWS manages 162 sites which are included on a preliminary inventory of marine managed sites, and the NPS manages an additional 39 sites. Through the Minerals Management Service, the Department manages the United States Outer Continental Shelf (OCS) for the environmentally sound production of oil, natural gas and other minerals. The OCS currently provides approximately one-quarter of the oil and natural gas produced in the U.S. Finally, the Minerals Management Service and the U.S. Geological Survey conduct significant programs of marine research in support of our programs to manage and conserve the areas under the Department's jurisdiction.

The Department strongly supports a basic premise of the Executive Order that Marine Protected Areas not only provide lasting protection for valuable resources but that they also support the environmentally and economically sustainable use of the marine environment. The Department has considerable experience with both of these concepts which we believe are not necessarily mutually exclusive.

In its review of Executive Order 13158, the Department identified several principles that would guide its future activities.

First, the Department believes that the Executive Order appropriately recognizes the adequacy of existing authorities, and provides no new authority for Marine Protected Areas. The authorities for the management of existing Marine Protected Areas are contained in their charters and in the organic authorities of the agencies that manage them. In the case of the Department of the Interior, these sites are National Parks, National Wildlife Refuges, and a National Monument. We believe that existing authorities are sufficient for the Department of the Interior to carry out the mandate of Executive Order 13158 effectively. We also believe these authorities are clear and well understood by the public. They should be the cornerstones of a Marine Protected Areas Program.

Second, we believe that any actions by the Federal Government regarding Marine Protected Areas must fully involve the people most directly affected by those actions. The Department of the Interior has a long history of land management. We understand and appreciate the important role of public input in our decision making. The Department most recently demonstrated its commitment to public participation through the Secretary's broad invitation for the public's involvement in the planning process for management of the many monuments established by the previous administration. We believe that public education and involvement should be major components of the Marine Protected Areas initiative.

Third, we believe that the Marine Protected Areas Advisory Committee is an extremely important tool for both of the Secretaries. This Committee offers the opportunity for the various interest groups to advise the Secretaries about the scope and direction of this program. We believe that it is critical that this Committee adequately represent the interests of the many marine user groups that may be affected by Marine Protected Area designations and management regimes.

The Department of the Interior and the Department of Commerce together have already begun to inventory Federally managed marine sites and are in the process of initiating the inventory of marine sites that States, localities, tribes and territories have set aside for the protection of one or more natural or cultural resources. This is a first step in a deliberate and careful process. At the end of this inventory of these sites and sites managed by Federal agencies, we must determine which are truly Marine Protected Areas, a process that highlights the importance of clear criteria and public involvement. Subsequently, we must determine if this "patchwork

quilt" of protected areas approaches an effective "National System" as envisioned in the Executive Order. If we determine that existing protected areas do not provide the benefits envisioned in the Executive Order, we must determine if changes in their management would provide those benefits. We see this as a long-term deliberative process in which good science and public review are critical. Our goal is to conduct a thorough analysis of existing Marine Protected Areas and how they provide or do not provide for an effective "National System" prior to considering the designation of new Marine Protected Areas.

The designation of new Marine Protected Areas is probably the facet of this program which arouses the greatest emotion. In addition to existing legislative authorities for designation, we believe that the designation of new Marine Protected Areas should be based on needs identified from the inventory of existing protected areas, and on sound science and full public review. We believe that the Executive Order is clear about the considerations that must precede the designation of a new Marine Protected Area. Some of those considerations should supplement existing processes required for the designation of protected areas under Federal statutes and laws such as the National Environmental Policy Act.

Finally, we believe that the Executive Order's requirement that Marine Protected Areas be monitored and evaluated for their effectiveness should be rigorously followed. This is an important process. We must be prepared to examine management regimes and protected area boundaries as part of this process and be prepared to take necessary steps to enhance the effectiveness of protected areas. As with all important components of this process, the evaluation of effectiveness should be based on the best available science and full public participation.

Mr. Chairman, the Marine Protected Area Executive Order gives all Americans with an interest in the marine environment an opportunity to participate in managing it for the present and the future. We must ensure that all interests are represented in these deliberations. We must bring the best available science to the process. Finally, we must remember that these areas have a purpose, and that purpose is the scientifically-based protection of marine life, conservation of important submerged cultural and natural resources, and ecologically and economically sustainable use of the marine environment for future generations. If we can successfully merge these requirements, we will develop a system that serves all Americans well.

Mr. GILCHREST. Thank you very much, Ms. Morrison.

Mr. Keeney, welcome.

STATEMENT OF TIM KEENEY, DEPUTY ASSISTANT SECRETARY FOR OCEANS AND ATMOSPHERE, U.S. DEPARTMENT OF COMMERCE

Mr. KEENEY. Thank you, Mr. Chairman, Chairman Gilchrest and Ranking Member Underwood.

Good afternoon. I am Timothy R.E. Keeney, Deputy Assistant Secretary of Commerce for Oceans and Atmosphere. Thank you for the opportunity to discuss the Department's views on Marine Protected Areas and to report on our progress in implementing the Marine Protected Areas Executive Order 13158.

Mr. Chairman, I would like to ask that my complete written statement be introduced into the record. Thank you.

Last June, Secretary of Commerce Donald Evans issued a statement on MPAs which we wish to include for the record as well, Mr. Chairman.

[The prepared statement of Secretary Evans follows:]

Statement by Secretary of Commerce Donald L. Evans Regarding Executive Order 13158, Marine Protected Areas (Dated: June 4, 2001)

Washington, DC—"The Administration has decided to retain Executive Order 13158 on marine protected areas. America must strive to harmonize commercial and recreational activity with conservation. We can do both.

This Administration is committed to improving conservation and research in order to preserve our great marine heritage. It is a national treasure. It must be protected and dutifully maintained.

At the Department of Commerce alone, the President's budget included $3 million in first time funding to support marine protected area activities consistent with existing law. If approved by Congress, these dollars can help us better manage this critical effort.

I also plan to appoint a Marine Protected Area Advisory Committee comprised of key experts and stakeholders. The membership will include academic, state and local, non-governmental and commercial interests. The process will be open and will draw on America's great reservoir of experience and expertise.

Past MPA designations like the Dry Tortugas in the Florida Keys were successful because they followed a well-planned process and secured grassroots support. The Dry Tortugas MPA offers a model for the years ahead.

Conservation can be balanced with commercial and recreational activity. It is our stewardship responsibility. We will work with the Department of Interior, the Environmental Protection Agency and other federal agencies to safeguard our valuable coastal and ocean resources for the tomorrows in which we all will live."

Mr. KEENEY. In this statement, he announced the Administration's decision to retain the MPA Executive Order.

Secretary Evans underscored the need to harmonize commercial and recreational activity with conservation and declared that we can do both. The Executive Order provides for a useful set of organizing principles for us to achieve these aims. I want to reaffirm the Administration's commitment to working with the Subcommittee to address the opportunities and challenges in using this promising resource management tool.

The term MPA is broadly used to describe specific marine areas that could be called reserves, parks, sanctuaries, refuges, fishery management zones, wildlife preserves and conservation areas. They come in a wide range of shapes, sizes and management characteristics established for different purposes with varying types of protection and uses. MPAs are most effective when used in combination with and as a complement to other management measures. MPAs have long been used by NOAA as a tool contributing to fishery management to rebuild fish populations, maintain healthy fish stocks, restore and protect marine habitats and recover protected species.

NOAA also uses MPAs to conserve areas for their ecological, historic, recreational, scientific and educational value under our authorities to establish national marine sanctuaries and, in partnership with coastal states, national estuarine research reserves.

Only a small portion of our MPAs are fully restricted in terms of extractive activities. We also know that once established, MPAs must be adequately supported, especially in two key areas: the enforcement of conservation measures and the monitoring of effectiveness of the site in achieving its goals. The MPA Executive Order stems directly from the recognition that the widespread interest in establishing MPAs is at all levels of government; provides opportunities for common approaches, terminology and objectives.

To this end, the Executive Order directs the Departments of Commerce and the Interior to work closely with all levels of government and stakeholders to coordinate and share information, tools and strategies for the effective management for the nation's diverse systems of MPAs.

The Order's mission and activities are intended to support existing MPA programs and statutory authorities. The order does not—and I repeat does not—designate new sites, create new authorities or change existing ones, focus solely on no-take reserves, set specific targets for habitat protection, restructure existing MPA programs or Federalize state or local programs.

The National MPA Center has been working across NOAA and with the Department of the Interior to build the foundation necessary to carry out the Executive Order. The following are some of the achievements that have been reached since the signing of the Executive Order in May of 2000: the order calls for the Department to establish an MPA Federal advisory Committee. The planned 25-member committee of resource managers, scientists and stakeholders will advise the Secretaries of Commerce and the Interior on the national system of MPAs. Establishing the committee has involved two rounds of nominations and dedicated efforts of a joint NOAA-Interior review team. We are nearing completion of this selection process.

Also, to help resolve the confusion over MPA terminology, we are developing a simple user's guide to MPA types and terms. We are also working to build a dialog with the fishing community by cosponsoring fishermen forums; holding a national conference on MPAs called RecFish II to be held in Florida early next year and briefing the Fishery Management Council Chairmen on the Executive Order next week in Sitka, Alaska.

We are also improving the mpa.gov website and holding a series of educational workshops aimed at increasing the awareness and understanding of MPAs. The Center is developing research strategies for natural and social science to meet the need for improved science-based decisionmaking on MPAs. In partnership with the Department of the Interior, we have also begun a comprehensive inventory of marine areas under all levels of management. Science and experience indicate that MPAs can be effective tools, especially when designed in concert with existing management measures and when planned and established with broad, meaningful and equitable stakeholder input.

In conclusion, we all value the nation's oceans and benefit from their sustainable use. Through NOAA's continuing efforts to use science-based MPAs as a proven management tool, we are working together with partners and stakeholders to protect the nation's most important marine areas and the human communities they support. We welcome the Subcommittee's involvement in this evolving national dialog regarding the role of MPAs as a management tool. Thank you, Mr. Chairman; I would be pleased to answer any questions.

[The prepared statement of Mr. Keeney follows:]

Statement of Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Chairman Gilchrest and members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the role of marine protected areas as a promising marine resource management tool and to report on the progress being made by the Department of Commerce in implementing the Marine Protected Areas (MPA) Executive Order 13158 of May 26, 2000. MPAs can be an important and versatile tool in meeting multiple objectives for conservation and resource use in the

marine environment. They are most effective when used in combination with, and as a complement to, other management measures. MPAs are, however, not without controversy. I will describe some of the current sources of confusion surrounding MPAs and how they are used, and highlight what NOAA is doing through the implementation of the Executive Order (E.O.) to encourage this healthy and evolving national debate.

Last June, Secretary of Commerce Donald Evans issued a statement on MPAs in which he announced the Administration's decision to retain the MPA E.O. He expressed the Administration's commitment to "improving conservation and research to preserve our great marine heritage" with $3 million in first time funding for the Department "to support MPA activities consistent with existing law." He underscored the need to "harmonize commercial and recreational activity with conservation" and "declared that we can do both." Subsequently, $3 million was appropriated for MPA activities in Fiscal Year 2002; and, again in the President's Fiscal Year 2003 Budget, the Administration has requested to retain the $3 million in funding for MPA activities. The E.O. charts a course of action for the development of a scientifically based, comprehensive national system of MPAs, representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources. Similarly, it offers a useful set of organizing principles for us to follow in achieving these aims. I want to reaffirm the Administration's commitment to working with the Subcommittee to address both the challenges and opportunities related to this resource issue. Today I would like to discuss several things, including some basic details about MPAs, such as what they are, how they are used, and some common misconceptions about them. In addition, I would like to discuss NOAA's charge under the E.O. and the status of the MPA Executive Order implementation.

What are MPAs and some common misconceptions?

The term "MPA" is broadly used to describe specific marine areas that are given some sort of special protection for marine resources. The term itself has been used for over two decades, while the concept of using MPAs for allocating and managing marine resources has been around for centuries. There are many different types of MPAs in use around the world today. They come in a wide range of shapes, sizes, and management characteristics, established for different purposes with varying types of protection and uses.

MPAs can be unique tools in marine resource management because they can shift the emphasis from the traditional single-species focus to the protection of a specific area or habitat. In so doing, they can often help meet multiple goals and objectives in a single area. MPAs are an important and frequently used tool for fishery management, with examples including area and seasonal fishing closures for the protection of habitat, or closures for restoration of depleted stocks. Other types of MPAs maintain biodiversity and functioning ecosystems, protect sensitive habitat and endangered species, preserve historically or culturally important submerged archaeological resources, or provide valuable opportunities for science, recreation, and education in natural areas. MPAs designed to increase scientific knowledge or protect biodiversity and MPAs designed for recreational or fishery-enhancement purposes are not mutually exclusive.

Last month, NOAA Assistant Administrator for Fisheries, Dr. William Hogarth testified on MPA policy before the U.S. Commission on Ocean Policy. Dr. Hogarth described how much of the current confusion and controversy regarding MPAs stems from the continued uncertainty about the terminology used to define what is an MPA or what activities will be prohibited if an MPA is established. The controversy also stems from the mistaken belief that there is some specific percentage of the marine environment targeted to be set aside from all use, as well as the perception that MPAs are synonymous with the complete prohibition of all extractive activities, such as fishing, mining, etc.

I am aware of the concerns the topic raises at all levels and agree with Dr. Hogarth's observations, especially with regard to the perception that MPAs are synonymous with total prohibitions. The perception that all MPAs are "no-take" reserves, when in fact MPAs can encompass (sometimes within the same site) a wide variety of management approaches and allowable uses, is perhaps the greatest point of confusion regarding MPAs.

MPAs may be called reserves, parks, sanctuaries, refuges, fishery management zones, seashores, wildlife preserves, and conservation areas. Sometimes the same term is used to describe distinctly different types of MPAs. The wide array of ill-defined terms to describe MPAs contributes to the high level of confusion among both proponents and detractors. This in turn creates contention, often where it need not exist.

In considering the use of MPAs, as well as other resource management tools, we must clearly identify the management problem to be solved and examine the range of potential solutions before determining that an MPA should be implemented. The success of any type of MPA is based on the protection it provides to ensure a healthy marine ecosystem and by the level of stakeholder participation and community support that can be achieved. We also know that once established, MPAs must be adequately supported, particularly in two key areas: the enforcement of any conservation measures that have been implemented and the monitoring of effectiveness to verify that the site is fulfilling the goals for which it was created.

How MPAs are used at NOAA.

NOAA uses MPAs as a tool to manage fisheries and other marine resources for a number of reasons. Among these reasons are rebuilding fish populations; maintaining healthy fish stocks; restoring and protecting marine habitats; recovering protected species; protecting areas for the purposes of science, education, and cultural and historic resources; and conserving the integrity of marine ecosystems on which healthy fish populations and protected species depend.

More specifically, we use MPAs to protect fish spawning areas; conserve essential fish habitats; and restore endangered, threatened, and depleted marine mammal, sea turtle, and fish populations. NOAA also uses MPAs to conserve areas for their ecological, recreational, cultural, scientific, and educational value under our authorities to establish national marine sanctuaries and, in partnership with coastal states, national estuarine research reserves. Our MPAs cover a wide gamut, ranging in size, purpose, and level of protection. Those related to the management of living marine resources form the largest category, both in terms of number and area. Only a small portion of these sites are fully restricted in terms of extractive activities.

Each living-marine-resource-management MPA is designed to fulfill particular objectives, such as rebuilding a distinct stock of commercially or recreationally targeted fish, recovering an endangered marine mammal or turtle species, or protecting a sensitive coral reef ecosystem. Unlike other types of MPAs, fisheries-management and related MPAs may not be designed to exist in perpetuity. Upon fulfilling its intended management objective, a particular MPA may be reduced in size or level of protection or may be discontinued. Temporary fishery closures or restrictions are still considered MPAs because they have been created as an area-based protection to fulfill a specific conservation objective. NOAA monitors and reviews all of its MPAs to ensure they are achieving their management objective and strives to implement changes in a timely manner where they are warranted.

NOAA also uses MPAs to provide valuable research on the status of species and habitats. For example, NOAA Fisheries is currently involved in several projects in the southeast region to monitor the status of reef fish and coral reef habitats in the Florida Keys National Marine Sanctuary (in conjunction with the Sanctuary), Oculina Bank Habitat Area of Particular Concern off the Eastern central coast of Florida, and the Hind Bank Marine Conservation District in the U.S. Virgin Islands. These MPA monitoring activities help the agency complete the annual Status of Fisheries report, a public document that details the status of managed stocks. More importantly, these types of MPAs provide valuable information regarding the characteristics of fish stocks and their habitats, such as rebuilding and recovery times, historical abundance levels, and population structure. This information can then be incorporated into fishery management plans for improved management. In addition, MPAs such as the Monitor National Marine Sanctuary and the Thunder Bay National Marine Sanctuary have been designated for the coordinated protection and management of submerged cultural resources, enabling researchers to further understand and build on the historical record made possible by the existence of these underwater shipwrecks.

Our charge under the MPA Executive Order

Signed on May 26, 2000, the MPA Executive Order stems directly from the recognition that the widespread interest in establishing MPAs among many Federal and state agencies poses a tremendous opportunity for conservation. To this end, the E.O. directs the Department of Commerce and the Department of the Interior (DOI) to work closely with other Federal, state, local, and tribal authorities, non-governmental partners, and stakeholders to coordinate and share information, tools, and strategies, and provide guidance on the use of technical and scientific studies to strengthen the effectiveness of existing MPAs. This includes support from evaluating the management effectiveness of existing MPA sites. The E.O. also directs the Department of Commerce and the Department of the Interior to develop a science-based framework for a national system of MPAs representative of the Nation's diverse natural and cultural ocean and coastal resources. The Order makes it clear

that our mission and activities are intended to support existing agency programs and statutory authorities and not to duplicate, overshadow, or interfere with them. Nonetheless, it is important to emphasize what the Executive Order does not do. It does not:

- designate new sites,
- create new authorities or change existing ones,
- focus solely on "no-take" reserves,
- set specific targets for habitat protection,
- restructure existing MPA programs,
- supercede or ignore best available science, or
- "Federalize" state or local programs.

The MPA E.O. defines "MPA" for the purposes of the Order as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws r regulations to provide lasting protection for part or all of the natural and cultural resources therein."

In identifying the development of a science-based framework and network approach for managing marine resources, the Order challenges us to improve science and coordination and encourages the use the various existing authorities associated with the many types of MPAs, as an important aspect of marine resource management strategy.

The E.O. recognizes that resource managers from Federal, State, and local agencies, tribes, regional fishery management councils, and others have been designing, implementing, and refining MPAs for decades and directs the Department of Commerce/NOAA and the Department of Interior to seek their expert advice and recommendations.

The E.O. calls for the establishment by the Department of Commerce of an MPA Federal Advisory Committee, which I will discuss in more detail shortly.

NOAA and DOI agencies are directed also to establish a publicly-accessible web site, mpa.gov, for disseminating information on MPAs and to publish and maintain a list of MPAs.

Status of Executive Order Implementation

The $3 million appropriated by Congress in Fiscal Year 2002 to the National Oceanic and Atmospheric Administration has enabled the agency to build the foundation necessary to carry out the E.O., including the establishment of the National MPA Center called for in the Order. Housed in the NOAA Ocean Service, the MPA Center receives staff level support from the NOAA Fisheries and NOAA Research agencies, as well as from the Department of the Interior's Minerals Management Service, National Park Service, Fish and Wildlife Service, and Geological Service.

The Center has co-located its Science Institute with the NOAA Fisheries Laboratory in Santa Cruz, California, and its Training and Technical Assistance Institute with the NOAA Coastal Services Center in Charleston, South Carolina. Both Institutes are actively working to fill some of the key information gaps regarding MPAs, and are forming diverse partnerships with other agencies, academia, and industry. The MPA Center and its two thematic Institutes are dedicated to the principle of leveraging external capacity by working closely with institutions already engaged in various aspects of MPA design, management, and evaluation.

With the appropriated funding, the Center has begun to focus on the national need for consistent information, education, science and analysis, and technical assistance and training on MPAs that the E.O. was envisioned to address. The Center has allocated these funds to focus on the national need for communication, education, and information ($950,000); science, analysis, and inventory ($1,150,000); and training and technical assistance ($900,000). Funds are being used in all three of these categories to engage stakeholders as called for in the Fiscal Year 2002 Marine Protected Areas Spending Plan for the Engagement of Stakeholder Groups, which was approved by House and Senate Appropriations Committees in March 2002. The National MPA Center will also play an instrumental role in helping to facilitate broad engagement in planning and public involvement processes for identifying, assessing, and evolving toward a more comprehensive and integrated network of MPAs. The following are some specific examples in three broad areas of what we have been able to accomplish since approval of the E.O. in May 2000 in engaging stakeholders, building the scientific foundation, and building capacity.

1. Engaging Stakeholders:

The 2001 National Academy of Sciences report on MPAs stressed the need to involve all potential stakeholders through all phases of consideration and implementation MPAs if they are to be successful and achieve their goals. In recognition of the importance of maximum involvement, NOAA continues to engage a broad range of

stakeholders in a national discussion on the potential of MPAs to conserve marine resources, while using these national and regional forums to gain input on needs and concerns surrounding MPA use. For example:

Advisory Committee -- The E.O. calls for the Department of Commerce to establish an MPA Federal Advisory Committee. We expect this Committee to be one of the key avenues for engaging stakeholders at the national level. The planned 25-member Committee would advise the Secretary of Commerce and the Secretary of the Interior on the development of a national system of MPAs. Establishing the Advisory Committee has involved two rounds of nominations and dedicated efforts of a joint NOAA–Department of Interior review team. Selecting a group of individuals representing the wide range of commercial and non-commercial interests and scientific disciplines related to the coastal, marine and Great Lakes environments from the nearly 350 well-qualified applicants has proven to be quite a challenge. We are nearing completion of this selection process. Once background checks are completed and formal appointments by the Secretary of Commerce are made, the first meeting of the Committee will convene.

Users' Guide To MPA Terms and Types -- There is considerable confusion about how MPAs are used and for what purpose. In order to create a common language among all participants in the MPA discussion, the MPA Center Science Institute is developing a simple "users" guide" to the many types and purposes of MPAs and to the growing body of scientific and policy terms used to describe them.

Outreach to Fishermen -- The National Marine Fisheries Service in collaboration with the MPA Center and NOAA Sea Grant Program will be holding a national conference on MPAs, called "RecFish II", in Florida in February 2003. The meeting is designed to enable the recreational fishing community to discuss their concerns regarding MPAs and provide an opportunity to contribute to a white paper for consideration by the MPA Federal Advisory Committee and other bodies. Earlier this year, the MPA Center Science Institute was instrumental in building a two-way dialogue with the fishing community on the west coast regarding the uses of MPAs and the underlying science and socioeconomic issues. The two Fishermen's Forums served to inform this key stakeholder group about the costs and benefits of MPAs, demonstrated the importance of effective participation in MPA planning processes, and provided a model for similar Forums in other parts of the country. And at the end of May, representatives from the MPA Center will brief the Chairs and Executive Directors of the Fishery Management Councils at their invitation on the E.O., the Center's current activities and work plans, and the legal authorities associated with the design and management of Federal MPAs.

mpa.gov Web Site -- The various components of the mpa.gov web site continue to develop in scope and size, particularly the virtual MPA library, maps, and background information on existing sites. The MPA Center plans to conduct a major revision of the web site to reflect the evolution in experience gained since the site was unveiled in 2000.

Education Workshops -- The Center is working with other NOAA programs in sponsoring a series of educational workshops for site-based educators to increase the awareness and understanding of MPAs among site interpreters, K–12 grade students, teachers, and the general public. The first MPA workshop was held in November 2001 in Maryland and two more are planned for California and Minnesota in September 2002.

2. Building the Scientific Foundation:

Most MPA legislation and policy requires science-based decision making in both the design, management and evaluation of MPAs. Relevant science ranges from oceanography, ecology, population dynamics, pollution threats, effects of human activities on marine processes, and carrying capacity, to aspects of the human dimension such as economic impacts, social systems, and cultural heritage.

Social and Natural Science Strategies -- The human dimension is critically important in the effective design and management of sites, and in their long-term support by the affected communities. Recognizing the growing demand to base MPA design and management on sound and transparent science, the MPA Center is developing parallel strategy documents on the natural and the social science needs for MPAs. In April, the MPA Center's Science Institute convened a workshop attended by over 80 scientists and practitioners from across the U.S. and Canada to identify information gaps and research priorities to form the basis for a social science strategy. This, along with a natural science strategy, expected in late 2002, will help guide the allocation of limited resources toward filling the most important information gaps.

Collection of Information on Existing U.S. Sites -- Before assessing how existing MPAs might contribute as part of regional networks and a national system, it is first necessary to determine what currently exists. NOAA and the Department of

the Interior have begun building a comprehensive database of marine areas under Federal, state, territorial, tribal, and local management. Profile information for about 280 sites from five Federal programs within NOAA and DOI has been collected. This information has been posted on the web site in mapped and text formats. A State Advisory Group has been established to provide guidance and recommendations as the team moves on to initiate the collection of state and territorial data.

Measuring MPA Effectiveness and Lessons Learned -- A second factor in assessing regional MPA networks or establishing a national system is determining the effectiveness of existing sites. Increasingly, MPA agencies are required, whether by law, policy or stakeholder demands, to demonstrate that MPAs are effective in meeting their goals and objectives. To this end, NOAA's MPA Center Science Institute is working with a variety of domestic and international partners to develop practical measures of MPA effectiveness, and to provide a single, publicly-accessible web site for monitoring results and trends in the health of protected ecosystems. Related to measuring effectiveness is the evaluation of the approaches used to establish MPAs by various authorities. In the past few years, a number of high-profile efforts have been undertaken to plan and establish MPAs, some more successful than others. In an effort to learn from these experiences, and to ultimately improve meaningful stakeholder engagement in MPA planning, the MPA Center Training and Technical Assistance Institute is conducting an analysis of the lessons learned from six recent processes in the U.S.

3. Building Capacity:

MPA Needs Assessment -- A major, comprehensive national needs assessment was completed in March 2002 by the NOAA Coastal Services Center in cooperation with the National MPA Center. The assessment targets the needs of coastal and marine resource managers for information, skills, tools and processes to foster the effective management of MPAs at all levels of government and marine uses.

Facilitate External Training -- The Training and Technical Assistance Institute will continue to populate the database for existing training and technical assistance providers. This database will be used to refer requests for training and technical assistance to appropriate providers. The Institute will also work with established providers to modify training so that it addresses MPA issues and MPA staff needs.

Fishery Management Council Technical Support -- The Training and Technical Assistance Institute has been providing a range of technical support for the South Atlantic Fishery Management Council as the Council moves forward with their decision to use MPAs as a management tool to aid in the recovery of severely overfished deepwater snapper-grouper species in the region.

Conclusion

We all share concerns about the increased demands being placed on living marine and submerged cultural resources and the mounting threats to the quality and abundance of these resources. Finding a way to meet our needs from the ocean while ensuring that these resources are sustained for the benefit of future generations is a challenge we all must confront. Science and experience indicate that MPAs can be effective tools to help manage, protect, and sustain the nation's valuable marine resources, as well as the people and economies that depend on them, but they are not a panacea to solve all management challenges. Many challenges remain as we implement the Executive Order, including finding ways to better integrate MPAs with existing authorities and approaches for meeting resource conservation goals. We welcome the Subcommittee's involvement in this evolving national dialogue regarding the role of MPAs as a management tool. Thank you Mr. Chairman. I would be pleased to answer any questions

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Mr. GILCHREST. Thank you, Mr. Keeney.

Ms. Morrison, you said in your testimony that the Executive Order gave you, Interior, and I assume you also meant Commerce, adequate existing authority for Marine Protected Areas, and so, you feel that there is no need for any type of legislation dealing with this issue or creating more expansive policies dealing with this issue.

Ms. MORRISON. Mr. Chairman, at this time, I think it would be premature to say that additional legislative action needs to be taken. I think as we evaluate each of the areas that we are, with

NOAA, creating an inventory of marine areas; evaluating their existing authorities to see if there is additional protection that is needed, and I think through that—what I would call a universal data base of the inventories and of those existing authorities—we can then make that decision determination better with NOAA.

Mr. GILCHREST. So with the Executive Order, Interior and NOAA are looking for areas that—and also looking for criteria, I would assume—first of all, looking for criteria upon which you might base Marine Protected Areas for parks, refuges, fishery management zones, conservation areas, sanctuaries and those kinds of things. So you are looking to develop criteria to set aside areas in the ocean for these types of reserves; is that correct?

Ms. MORRISON. I think that is essentially correct, yes, yes, sir.

Mr. GILCHREST. And at this point, no additional legislation is needed to pursue that, developing criteria for various areas that can be set aside for various reasons, whether it is fishing or conservation or refuges or whatever.

So, Mr. Keeney, you said that the Executive Order—at this point, the Executive Order does not designate new sites other than what we have right now; does not create new authorities; focuses solely on no-take reserves; sets specific targets for habitat protection and so on, but you do not have any authority to designate new sites that could be a refuge, a sanctuary or whatever under the Executive Order?

Mr. KEENEY. That is correct, Chairman Gilchrest. We believe the Executive Order, though, has been extremely helpful in getting NOAA to integrate its existing statutory authorities, and it gives us sort of an umbrella to review all of the protected areas that we currently have and to look at them in their totality.

Mr. GILCHREST. Will Interior or NOAA, sometime within 6 months, a year, 5 years, recommend different additional areas based on your research to be put into a certain category that could be called protected or a sanctuary or a refuge or a fishing reserve, et cetera?

Mr. KEENEY. Mr. Chairman, we can do that under existing statutes.

Mr. GILCHREST. Pardon?

Mr. KEENEY. We can do that under existing statutes, find additional protected areas.

Mr. GILCHREST. And then designate them as protected?

Mr. KEENEY. We can.

Mr. GILCHREST. You can now?

Mr. KEENEY. Yes.

Mr. GILCHREST. What advantage did the Executive Order give you?

Mr. KEENEY. I think the primary advantage it gave us was the ability to review all existing protected areas from the scope of what does a protected area mean to begin with? As you know, we use Marine Protected Areas for many different reasons, and this also allows us to work more closely, with our co-department, the Department of the Interior, to jointly work out some of the issues and to better manage the resources that we have.

Mr. GILCHREST. Did both Interior and NOAA work on the sanctuary in the Florida Keys together? Or did you have anything to do with that?

Mr. KEENEY. Yes, Mr. Chairman, we did work together jointly on the designation and management plan for the Florida Keys Marine Sanctuary Area. The Dry Tortugas area is a national park, and it was actually designated as a no-take for fishing area after a very extensive review with all of the stakeholders involved: fishermen, residents of Florida, Department of the Interior and other state and local authorities.

Mr. GILCHREST. So your participation in the development of that particular sanctuary came from existing authority in NOAA and if Interior participated in that. Did the Executive Order give any enhanced authority in that process?

Mr. KEENEY. I do not believe the Executive Order gives us any enhanced authority. As I recall, we had a statute that actually directed us to—

Mr. GILCHREST. I see.

Mr. KEENEY. —to designate the Florida Keys as a marine sanctuary. It was passed in 1990.

Mr. GILCHREST. The last question that I have is if you look at existing authority, and you look at the Executive Order, where do those intersect with the Oculina area off Florida and the decision to close George's Bank some few years ago?

Mr. KEENEY. The Oculina area off of Florida and the George's Bank off of New England are areas that are specifically managed under the Magnuson Act, Magnuson-Stevens. But this Executive Order will assist us in integrating the appropriate management of those areas.

Mr. GILCHREST. So there is a great deal that can be learned about—it seems to me that those areas now are under review. There is a lot of information coming out from those areas about the benefits to the full range of that ecosystem, and I would assume, then, that the knowledge gained in those two areas, Oculina and George's Bank, can be replicated and adapted in other areas, I would hope.

Mr. KEENEY. Absolutely.

Mr. GILCHREST. And just a quick closing comment, and then, I will yield to my friend from Guam. As we go through this process, and I am sure that both of you have made that definitive statement that bringing in all of the stakeholders in the process is really vital for the success of that process. And it seems that while there are some hiccups in the sanctuary in the Florida Keys, once that became apparent that that was part of the success of that project.

Mr. KEENEY. We believe that was probably the most important element in designating the Florida Keys Sanctuary and in putting together the management plan.

Mr. GILCHREST. Thank you very much.

Mr. Underwood?

Mr. UNDERWOOD. Thank you very much, Mr. Chairman, and thank you for the questions and the extent of their authority and whether new legislation is needed. I think down the road, there has to be some decisions made about whether new legislation is needed regarding the MPA Executive Order.

This is a question for both of you, and I am interested in hearing your perspectives about how the two agencies coordinate with each other in the designation of MPAs. Structurally, how does that work, since you are both here?

Ms. MORRISON. Mr. Underwood, what we have taken in the Department of the Interior, there is a Mr. Joe Uravitch at NOAA that we are coordinating with, and we are working through a list of issues with them. It seems to be about on a weekly basis that we touch base, and to the extent that we have meetings with the States or meetings with stakeholders. We are doing that jointly and staffing that through MMS as well as through Fish and Wildlife.

So it is a group with the acting director for MPAs, Joe Uravitch, at NOAA as well as myself and my staff, and we are meeting roughly every week.

Mr. UNDERWOOD. Mr. Keeney, do you have a response to that?

Mr. KEENEY. Yes, Congressman Underwood. Any rule that we develop at NOAA goes through interagency review and necessarily would be reviewed by the Department of the Interior. Also, statutes like the Marine Mammal Protection Act and the Endangered Species Act give joint authority to each department with particular responsibilities, and there are many occasions when we are both involved in trying to address the challenges that those acts present.

Mr. UNDERWOOD. I know you mentioned this, Mr. Keeney, in your testimony; you did not, Ms. Morrison, but talking about the advisory council, it seems that this has taken some significant amount of time to put the council in place. So what is the current status of that, and when can we see it come into place? And if you do not have sufficient candidates, I can suggest some candidates.

Ms. MORRISON. Currently, Mr. Underwood, we are reviewing the candidates for that council, and I would expect very shortly we will have that advisory council pulled together. Both agencies have offered up candidates, and we are going through that process that I described earlier with Mr. Uravitch.

Mr. UNDERWOOD. So we can—I mean, the length of time that it has taken, you know, I understand that of course with a new administration, a lot of things take time to come about. But there is no reason to interpret that the length of time that it has taken to develop the council means any diminished commitment to the Executive Order?

Mr. KEENEY. Certainly not. In fact, NOAA and the Department of the Interior staff completed a review of nearly 350 nominees in late February of this year, and we expect very soon to have a final determination of who the 25 members or nominees will be for that advisory council.

Mr. UNDERWOOD. And are there any holdovers from the previous council? Are there any holdovers?

Mr. KEENEY. I am sure there will be some.

Mr. UNDERWOOD. In your testimony, Ms. Morrison, you indicated that no new MPAs are contemplated.

Mr. KEENEY. No, we are not contemplating any—well, under existing statutes, we are always looking at the use of Marine Protected Areas as a management tool; for instance, just the groundfish closures that just came out off of the George's Bank and off of

Maine a few weeks ago, the rolling closure approach could be looked at as a Marine Protected Area. But we are not anticipating as a result of the Executive Order, per se, designating additional areas.

Mr. UNDERWOOD. Under what process is an MPA withdrawn?

Mr. KEENEY. I guess that depends on the statutory authority setting up the MPA to begin with.

Mr. UNDERWOOD. You know, I guess I ask that because I just want to make sure that, you know, in support of the Executive Order and trying to understand the Chairman's line of questioning, I am trying to understand whether there really is a need for clear statutory language on how MPAs are dealt with, because, you know, as a resource management tool, it is fine, and as a process of collaboration, use of the advisory council, trying to figure out how MPAs are established, how they are disestablished, to the extent that those processes are clarified by both agencies here, then, it would give more comfort, I think, to the Subcommittee that legislation is not necessary.

To the extent that it is just kind of hanging out there, and no clarity is given to it, it tends to invite interest on the part of the Subcommittee for legislation.

Mr. KEENEY. Well, Congressman Underwood—

Mr. UNDERWOOD. If you get my drift.

Mr. KEENEY. —I think we have clear authority under existing statutes like the Marine Mammal Protection, the Marine Sanctuaries Act, the Coastal Zone Management Act that authorizes the national estuarine research reserves, the Magnuson-Stevens Act. These acts give us clear authority to set up Marine Protected Areas. So we do not believe that there is any particular question about what a Marine Protected Area can be, but under the Executive Order, we are currently reviewing, what the proper definition would be under the Executive Order.

Mr. UNDERWOOD. Then, under the existing statutes, is NOAA interested in establishing any new reserves?

Mr. KEENEY. Yes, of course, in consultation with Congress, we do look at the potential need for additional protected areas. Now, a good example would be the East San Francisco Bay that we are currently reviewing to be a national estuarine research reserve. In fact, I had an opportunity to fly over it just this past weekend, and it is a pretty fascinating and interesting area. And we have various issues involved with what we want to include within the boundaries of the reserve and what the purpose of the reserve will be.

We do have existing authorities that allow us to do that.

Mr. UNDERWOOD. OK; thank you. Does that take into account all of the baseballs that are hit into the bay—

[Laughter.]

Mr. UNDERWOOD. —at Pac Bell Park?

Mr. KEENEY. We will have to review that as one of the potential restricted uses.

Mr. UNDERWOOD. OK; thank you.

Thank you, Mr. Chairman.

Mr. GILCHREST. Oh, so you do not want them to do that anymore?

Mr. UNDERWOOD. No, I am a Dodger fan.

[Laughter.]

Mr. GILCHREST. That is good. I am a Brooklyn Dodger fan.

[Laughter.]

Mr. GILCHREST. Well, just a quick comment on Mr. Underwood's line of questioning.

It appears from your perspective, Ms. Morrison and Mr. Keeney, that additional statutory authority is not necessary for you to pursue your working relationship, in this case between Minerals Management Service and NOAA to study and review and then, possibly designate new Marine Protected Areas; is that correct?

Mr. KEENEY. That is correct.

Mr. GILCHREST. Could—

Ms. MORRISON. That would be correct for the Department of the Interior as well.

Mr. GILCHREST. Could you through existing authority and whatever impact that has with the Executive Order create Marine Protected Areas in the EEZ, anywhere in the EEZ?

Mr. KEENEY. Yes, we can, under the Magnuson Act and the Marine Sanctuaries Act.

Mr. GILCHREST. So Mr. Underwood said that sometimes, we feel a little tentative when, for example, it has been 2 years since the Executive Order was issued, and there is no advisory committee announced yet. And are there any regular meetings between Interior and Commerce on this issue? And how does the Minerals Management Service work with the Park Service and the refuge system? Are any of those nuances—do they all work efficiently? Do you meet regularly? Are you going to announce within the next 3 months an advisory group? Do we need legislation to say there are certain timeframes for all of this to happen?

Mr. KEENEY. Mr. Chairman, we do meet regularly. We meet every week, representatives of NOAA and members of the Department of the Interior. We believe that the members or the nominees and then subsequent members will be announced sometime soon, and we do not need additional direction from Congress.

Mr. GILCHREST. From the Congress? You do not want additional direction from the Congress?

[Laughter.]

Mr. GILCHREST. I am surprised!

[Laughter.]

Mr. GILCHREST. Mr. Underwood, any more questions?

Mr. UNDERWOOD. Yes; I just have one follow-up question.

Mr. Keeney, could you tell us a little bit about the status of the designation process for the Northwest Hawaiian Islands Coral Reef Reserve? There have been some concerns expressed about it that there is perhaps a weakening of interest in its support?

Mr. KEENEY. Certainly, Congressman Underwood. We really have just begun the designation process, and we have had recently, within the last 6 weeks, a series of scoping meetings, I think, held out in Hawaii and on all of the islands.

We have a very open and public process that we pursue, and we are looking to use the best science available as well. We have no predetermined positions on the management plan for the soon-to-be designated marine sanctuary. We expect the process, the entire

process to put together a management plan and to put it in place will take some two to 3 years. And that is all I have.

Mr. UNDERWOOD. OK; thank you.

Thank you very much.

Mr. GILCHREST. We look forward to working with both of you on all of these issues, and thank you for your participation here this morning. We do want to stay engaged in this issue, because we feel this type of management tool, if appropriately applied, can help us realize enormous benefits.

Thank you very much.

Mr. KEENEY. Thank you.

Ms. MORRISON. Thank you, Mr. Chairman.

Mr. GILCHREST. Our next panel, panel No. 3, is the adjunct staffer to the Subcommittee, Dr. Edward Houde. Did I say that appropriately, Dr. Houde? Adjunct staff member to the Subcommittee.

[Laughter.]

Mr. GILCHREST. Actually, Dr. Houde is chairman of the NRC Committee on Marine Protected Areas; Professor, University of Maryland Center for Environmental Studies; Dr. Robert Shipp, Chair, Department of Marine Sciences, University of Southern Alabama; Mr. Jim Gilmore, Director, Public Affairs, At-Sea Processors Association; Mr. Gerry Davis, Guam Department of Agriculture, Acting Chief, Division of Aquatic and Wildlife Resources; Dr. Robert Warner, Professor, Department of Ecology, Evolution and Marine Biology, University of California at Santa Barbara.

Welcome. You may come up to the table.

Gentlemen, by your presence, I have a sense that the IQ is rising in this room. Thank you for your attendance here today. I want to assure everybody that there is no imminent pending legislation with MPAs, but we are interested in the process that the executive branch is following. We would like to be a part of that process, Mr. Underwood and I, and so, we are interested in your perspective on the potential possibilities for existing Marine Protected Areas in all their various forms and the possibility for additional areas categorized as such.

Welcome.

Mr. Underwood, do you want to say anything about the gentleman from Guam?

Mr. UNDERWOOD. I already did in my opening statement. He is a very fine gentleman, I might add.

Mr. GILCHREST. Thank you.

Dr. Houde, welcome again to our humble abode. We appreciate your patience with our persistence. You may begin, sir.

STATEMENT OF EDWARD HOUDE, CHAIR, NRC COMMITTEE ON MARINE PROTECTED AREAS AND PROFESSOR, UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL STUDIES

Dr. HOUDE. Thank you, Mr. Chairman and thanks to the Subcommittee for inviting me once again to testify.

I chaired a National Academy of Sciences study on MPAs a couple of years ago which was published last year. That study reached favorable conclusions regarding the potential of MPAs for marine fisheries management as well as to preserve habitat and biodiversity in the sea.

Today, I will summarize some of the Academy recommendations and also present personal views on the potential of MPAs. Most of my comments relate to MPAs and fisheries management.

MPAs represent a hierarchy of spatial management measures, ranging from wilderness areas where no removals of organism or substrata are allowed and no impact is tolerated to areas where only a few specific restrictions may be designated.

Recent reviews by the National Academy of Sciences and by a NMFS Ecosystems Principles Panel that was mandated by Congress concluded that MPAs, including marine reserves, which are sometimes referred to as no-take areas, have a role in the management of U.S. coastal fisheries, especially if combined with conventional management approaches.

Although area closures have been used in fisheries management literally for centuries, they are seldom a major management alternative. Conventional management depends mostly on controlling fish catches and fishing effort. Broader implementation of MPAs would shift that emphasis to recognizing the importance of the patchiness and spatial heterogeneity in marine ecosystems and the need to preserve their structure to sustain fisheries. Area closures are recognized explicitly as a possible tool in the Magnuson-Stevens Act, but there is relatively little supporting language to encourage their innovative use or to conduct research on their potential.

In planning and designating MPAs, it is essential that all stakeholders onsite and off be involved from the outset. This was a major conclusion of the National Academy and I think probably a consensus that we will have here. Selecting MPA sites is critical. The most valued MPA sites probably will be the most productive habitats of marine ecosystems. These are often described as source sites that will contribute to spillover of young fish to open fishing areas as opposed to sinks that may collect dispersed young fish but contribute relatively little to fisheries.

Personally, I do not believe that there is any particular size and number of MPAs that can be recommended for fisheries management or to protect marine ecosystems. In some cases, rather small MPAs may be effective. In other cases, a large fraction of marine ecosystems, possibly more than 50 percent, should be closed if an MPA is to be effective. MPAs must be planned and designed to fit the circumstances to operate in conjunction with conventional management.

The NAS study recommended that zones should be developed for prescribed uses of marine areas within broader coastal zone management planning. MPAs may cross agency jurisdictions, and conflicts may not only involve different users, for instance fishermen, transportation, mining interests, but also agencies with jurisdictional responsibility and authority. There will be a need for cooperation and coordination among state and Federal agencies for successful establishment of zoned regions that include a hierarchy of MPA types. Networks of MPAs also were recommended by the NAS and Presidential Order 13158, which actually, I think, asks for the development of a framework for a national MPA network. Effective development of such networks will require broad knowledge of oceanography and community ecology as well as a strong

appreciation of its human uses. Admittedly, much of the knowledge required is rudimentary at present and in need of dedicated research.

Predicting how an MPA will perform requires a knowledge of the dispersal behavior of organisms at different life stages. Will young fish be exported from an MPA and spill over its boundaries into areas open for fishing? Will an increase in fecundity and egg production by adults in an MPA result in increased recruitment of young fish to areas open to fishing? Will mobility of the stock be so great that an MPA does not afford sufficient protection to control fishing mortality?

If the objective of an MPA is to protect a community or many species, will the different behaviors of the many organisms act to protect only a fraction of them?

To date, there is strong evidence that stocks within MPA boundaries have become more abundant; individuals are larger and older, and fecundities are increased. These are the expected responses when fishing mortality is reduced and could, in many cases, be obtained by other management methods. There is evidence that spillover and dispersal beyond boundaries does occur for some species in fisheries, although more research and modeling is needed.

I believe that if the objective is fisheries management, mechanisms should exist to allow changes in MPA policies and design if performance does not meet expectations. For example, MPAs could be designated with fixed time limits during which evaluation of performance would determine if an MPA was successful, or if its design needed revision, or if it should be terminated in favor of other management approaches. Management policies that include MPAs should be instituted with the same adaptive flexibility as measures used in conventional fisheries management.

Like all fisheries management tools, there are costs and benefits associated with MPA management. In fisheries, unless a stock has collapsed, it is not likely that there will be economic incentives to adopt MPAs; nor is it likely that there will be near-term increases in profitability from MPA implementation. Benefits are likely to be long-term and a consequence of stabilization and recovery of critical components of an ecosystem in response to MPA implementation.

In closing, Mr. Chairman, I know that you are aware that there are many reasons to protect marine ecosystems beyond fisheries management. Creating parks; protecting unique habitats or historical sites; and protecting vulnerable species and biological communities are valid reasons to create MPAs. In fisheries, MPAs are not a stand-alone approach. But they do have a role in management as part of a balanced package of management methods.

Mr. Chairman, I wish to thank you and the Subcommittee for holding this hearing on MPAs. It is a timely topic of importance to fisheries and to the broader interests of U.S. citizens who are concerned about marine ecosystems and the utilization of marine resources. If I can answer questions, I would be pleased to do so.

[The prepared statement of Dr. Houde follows:]

Statement of Edward D. Houde, Professor, University of Maryland Center for Environmental Science

Introductory Comments

I appreciate having the opportunity to address the Subcommittee and to present my views on the potential of Marine Protected Areas (MPAs) as an effective tool to manage marine fisheries and to conserve marine ecosystems. My comments represent personal views and do not necessarily represent views of the University of Maryland's Center for Environmental Science (UMCES).

Marine Protected Areas, if broadly adopted for marine fisheries and marine ecosystem management, will shift emphasis from controlling amounts of catches (removals) and amounts of fishing effort in marine ecosystems to an increased emphasis on spatially-explicit management. Adoption of MPAs as a significant component of a suite of ecosystem-based approaches for marine fisheries management will add emphasis to conserving the productive capacity of the ecosystem, in addition to its individual stocks.

Habitats and Spatial Management: a Role for Protected Areas

The NMFS Fisheries Ecosystem Principles Advisory Panel (NMFS, 1999) and the National Academy of Science's Committee on Marine Protected Areas (NRC, 2001) strongly recommended incorporation of protected areas and other spatially-explicit approaches for fisheries management into ecosystem approaches for fisheries management. These approaches can move management towards more ecosystem-sensitive approaches that can protect essential fish habitats, reduce bycatches, and protect threatened species. Closed areas, no-take zones, and other spatial restrictions on fishing or exploitative use are not new to fisheries management. Yet, they are seldom a major tool selected as a management option. Marine protected areas (MPA) represent a hierarchy of spatial measures, ranging from wilderness areas, where no removals are allowed and no impact on habitat is tolerated, to areas where only a few restrictions on use may be designated. Three recent reviews and evaluations have concluded that MPAs, including marine reserves (no-take areas), have a role in management of U.S. coastal fisheries, especially if combined with conventional management approaches (NMFS, 1999; NAS, 1999, 2001). The consensus is that MPAs can be effectively included in broad coastal zone management plans to promote habitat protection/restoration and serve the goals of sustainable fisheries management.

The sea is a patchwork of habitats and water masses that support fishery stocks and biological communities at varying levels of productivity. This patchiness is appreciated by fishers who don't cast their nets randomly but focus effort in historically productive areas where fish aggregate around preferred habitat. As a consequence, stocks may be depleted and habitats impacted by fishing activities that are concentrated in productive parts of coastal zones. Broader implementation of MPAs in fisheries management would shift the emphasis of management policies from controlling catches and effort to recognizing the importance of spatial heterogeneity in marine habitats and the need to preserve the structure of marine ecosystems to ensure sustainable fisheries. Area closures to protect individual stocks have been a traditional management tool for centuries. Extending the concept to protect the ecosystem and its biological community for the benefits of multispecies management is an extension of the area closure concept, although more complex. Will all stocks benefit? Will benefits accrue to the aggregate fisheries? What are the costs of managing MPAs vs conventional management approaches? For many marine ecosystems, answers to these questions may not be immediately available.

Marine Protected Areas

The concept of marine reserves or other closed areas, with various restrictions on fishing and other human uses, was recognized in the 1996 reauthorization of the MSFCMA and has been on the planning tables of Regional Councils in recent years. Some marine areas have, in fact, been closed to certain kinds of fishing effort (e.g., parts of Georges Bank). The NAS Committee (NRC 2001) concluded that MPAs have a role in fisheries management as well as in conserving biodiversity and the integrity of marine ecosystems that are affected by human activities.

In a broad sense, setting aside areas as MPAs to protect spawning stock can serve as a buffer against the uncertainties and errors of stock assessments or effectiveness of regulations, i.e., a kind of insurance. More specifically, the NAS Committee recommended that MPAs for fisheries management should be designed as parts of broader networks of MPAs that are zoned for prescribed activities, and that these networks be embedded in an even broader plan of coastal ocean management that

considers the full spectrum of human activities and need to protect ecosystem structure and function.

In the context of fisheries and fishing impacts, properly designed MPAs can:

- Protect nursery areas
- Protect or restore critical habitats
- Limit bycatch
- Protect threatened or endangered species
- Rebuild age and size structure of stocks (and increase fecundity)
- Promote spillover and dispersal from protected to open fishing zones
- Reduce fishing mortality rates
- Reduce the need for stock assessment science
- Recognize "uncertainties" in science and management and adopt MPAs as insurance
- Promote education and research on marine ecosystems.

However, as with implementation of other kinds of fisheries regulations, there may be economic costs to traditional users of fishery resources associated with initial designation of MPAs. It is for this reason that fishers and other stakeholders must be included in all phases of MPA planning and implementation.

There is strong evidence that MPAs lead to increased abundance and sizes of protected species within the boundaries of reserves, but the benefits to surrounding areas are less certain in the absence of knowledge of dispersal or migration patterns of key organisms in a protected community. There is evidence that benefits may be exported to surrounding regions in some cases, including estuarine fisheries in Florida (Roberts et al., 2001).

MPAs will not solve all fishery management problems but their role and potential should be recognized. For example, language in the pending reauthorization of the Magnuson–Stevens Act could be added to: 1) address the issues and identify probable benefits of MPAs; 2) specify research needs; and 3) develop criteria for MPA implementation.

Planning and Design

Performance of MPAs is dependent on adequate planning and design, whether the overall goal is to promote biodiversity, manage fisheries, or some combination of goals. Design of effective MPAs should proceed through four sequential stages: 1) evaluate conservation needs at local and regional levels; 2) clearly define objectives and goals for establishing an MPA; 3) describe key biological and oceanographic features of the region; and 4) identify and choose site(s) that have highest potential for implementation.

To assure success in MPA implementation, it is essential that all stakeholders, including those geographically distant from the site, participate in the planning and design phases. Affected communities, especially fishing interests, cannot be isolated from a process that will impact their way of life and earning potential. In many cases, establishment of MPAs will have goals that go beyond improving fishery management (e.g., protection of biodiversity, rare species, habitats, cultural sites), and it is essential that the broad community of stakeholders be fully aware of, and involved in, the planning phase of MPA designation.

Selecting MPA sites is no simple task. There are few case studies on MPAs in U.S. waters and little knowledge of long-term performance of protected sites. Two major gaps in knowledge that are problematic are lack of information on movements of fish and a poor understanding of the responses of fishers to area closures. Dispersal of fish eggs and larvae, or migrations of older stages, are critical in MPA site selection. The nature and level of dispersal of early life stages and the so-called "spillover" of young fish from an MPA to open areas depend upon a complex interaction of oceanographic factors and stage-specific behaviors of fish. Although little is known directly about these factors and interactions, modeling research clearly demonstrates that dispersal, combined with behavior of fishers outside the MPA, is a major determinant of whether an MPA will be a success (Lauck et al., 1998; Hastings and Botsford, 1999; Sladek–Nowlis and Roberts, 1999; Holland, 2000; Mangel, 2000). Potential MPA sites that serve as "sources" for dispersal, rather than "sinks" that receive dispersed migrants have the highest potential to improve fisheries that are under heavy exploitation (Crowder et al., 2000). Furthermore, it is very likely that protection of highly productive habitats and nurseries, rather than expanses of relatively unproductive areas, will provide greatest benefits to fisheries restoration and management.

Size and Number

There is no general rule, in my view, for allocating size, area, or numbers of MPAs to a marine ecosystem. Location, size and number of potential MPAs certainly must

be considered in developing an MPA strategy. In some cases rather small MPAs, or networks of MPAs, in critical areas may play a significant role in protecting fish stocks, e.g., protecting vulnerable spawning aggregations of reef fishes. In other situations, e.g., for sedentary species of long-lived demersal stocks, percentages of an ecosystem much larger than 20%, a percentage often recommended, will be required to sustain or restore fisheries productivity (Lauck et al., 1998: Walters, 2000), especially if effective conventional management measures are not rigorously and synoptically applied. Modeling research indicates that, as a stand-alone management approach, MPAs occupying as much as 30–70% of a management region might be required.

Hundreds of MPAs are presently designated in the U.S. coastal zone, but a minuscule number have fisheries management as their primary goal and even fewer are true marine reserves where fishing is not permitted. The NOAA Marine Sanctuary Program is one prominent effort in which 13 sanctuaries have been established but, with only a few exceptions, the sanctuaries presently do not address fisheries management concerns in any major way. The Regional Fishery Management Councils presently are developing MPA plans within their respective jurisdictions. It seems clear to me that implementation of MPAs will increase in importance in the U.S. during the next decade as ecosystem approaches for fisheries management and the need to conserve biodiversity and habitats become prominent. In anticipation of this trend, careful site selection and consideration of the need to zone and network MPAs are recommended to assure that MPAs will meet performance goals.

Conventional Fisheries Management and MPAs

Conventional management that emphasizes controls over effort and catches will continue to be employed because fishing will continue and effort probably will increase outside the boundaries of MPAs after area closures.

The NAS Committee (NRC, 2001) considered weaknesses and drawbacks of conventional fisheries management in the context of alternative MPA-based management. Quota and effort controls have not always led to sustainability in U.S. fisheries and many analysts claim that conventional approaches have failed to achieve sustainability (Botsford et al., 1997). Quality of stock assessments is often uncertain; stock abundance or fishing mortality-rate reference points and targets are poorly known or imprecise for many fished stocks. Uncertainties in stock assessments, combined with overcapacity, the major problem in management of U.S. fisheries (NRC, 1999), lead to failed effort control, followed by declining stocks and poorly performing fisheries.

The NAS Committee concluded that MPAs can benefit habitats and fishery resources, but near-term benefits in yields or profits of MPAs to fishers are not certain or may be negative. MPAs can protect vulnerable habitats from destructive fishing practices and other threats and they may be particularly effective in protecting nurseries that support young fish. MPAs properly located can reduce bycatch of prerecruits of targeted species and reduce the unintentional catches of non-target species. They can be effective in protecting endangered or threatened species of mammals, turtles and birds. And, MPAs potentially can reduce excessive mortalities on species such as the tropical groupers that form highly vulnerable spawning aggregations. The argument that MPAs are insurance against the uncertainties of complex science and conventional management has merit and justifies consideration of MPAs as a management tool.

Developing MPA Zones and Networks

Coastal regions are heavily utilized or appreciated by a multitude of industries and interests, which often are competing for resources or other benefits and services of marine ecosystems. In the U.S., the coastal ocean falls under jurisdictions of several Federal, state, and local authorities. Effective management ultimately will require zoned use and cooperation, not only among users but also among management agencies. The possibilities for zoned use to alleviate conflicts and spatially partition acceptable uses of habitat should be considered; and, the potential to develop networks of complementary MPA sites to raise the probability for success should be evaluated. The NAS study (NRC, 2001) recommends that MPAs, zoned for specific uses, ultimately must be developed within the broader context of coastal zone management. Also, the report recognizes the broad spectrum of protected areas and reserves that could be designated. MPAs of various types, extending from terrestrial habitats to offshore, might be implemented within the jurisdictions of local, state and Federal authorities. Such designs imply linkages and convey the obvious need for cooperation and coordination among agencies to insure effective MPAs that are protective of resources and habitats.

Designating protected areas and reserves of appropriate size in proper spatial context can enhance contributions of MPAs to habitat protection, biodiversity, and overall productivity. Networks of MPAs have been proposed as an effective means to expand their utility. Networks imply that linked and complementary systems of MPAs (implying connectivity) can provide added value to protection and restoration of fishery resources. Effective development of such networks requires broad knowledge of oceanographic characteristics, habitats, and community ecology, which is not consistently available for many marine ecosystems. A Presidential Executive Order (No. 13158) was issued by President Clinton in May 2000 that called for development and implementation of a coordinated network of MPAs in the U.S. coastal zone. This Order directs the National Oceanic and Atmospheric Administration (NOAA), in cooperation with the Department of the Interior, to establish a MPA Center and develop a framework for a national system of MPAs (See http://www.mpa.gov/).

Monitoring and Enforcement

Many of the thousands of protected areas in marine ecosystems throughout the world are little more than "paper parks" because there is no enforcement of fishing and other regulations, or monitoring of ecosystem properties to determine if the MPA is performing up to expectations. Plans for routine monitoring and enforcement are essential and should be developed during the MPA design phase. Monitoring must include collection of socio-economic information on costs and benefits as well as information on fisheries catch and effort, habitats, and water quality.

Expectations for MPA performance may differ for single-species protection relative to MPAs for multispecies (or community) protection. Monitoring and regular evaluation of performance are required if MPAs are adopted as a major component of a marine-ecosystem or fisheries-management regime. It goes without saying that enforcement of boundaries and MPA regulations is essential for a spatial approach to be effective.

Performance Issues

The performance of MPAs depends on the particular migration and dispersal behaviors of organisms at each relevant life stage (Fogarty et al., 2000). In a fisheries context, MPAs usually are designated with the expectation that benefits will be exported from the protected area to some wider surrounding area. That expectation should be evaluated through reviews of the state of knowledge, by experiments and by modeling during the MPA design phase. To date, most evidence of MPA success in rebuilding fished stocks and restoration of ecosystem properties has been observed "within" an MPA's boundaries. Export of benefits to surrounding regions (a usual goal) is less certain and dependent on dispersal patterns of fish and behavior of fishermen in areas that remain open to fishing.

If MPAs are implemented, mechanisms should be in place to allow amendments to MPA policies and designations if performance does not meet expectations. For example, MPAs for fisheries management could be designated with fixed time limits during which evaluation of performance would determine if the MPA has met management goals. Non-performance should lead to revision of the MPA design or termination of an MPA in favor of alternative management approaches. Spatially-explicit management policies that include MPAs as a major tool should be instituted with the same adaptive flexibility as measures used in conventional management.

Research Needs

There is relatively little knowledge regarding performance of MPAs as a fisheries management tool. Research on fish dispersal and migration is critical to determine whether a designated MPA will be productive and serve as a source for spillover to areas that remain open to fishing. Evaluation of sizes and shapes of reserves with respect to reserve perimeter/area ratios and effects on dispersal for many species of fishes and fish assemblages are needed. Socioeconomic research on the impact of MPAs on fishermen and fishing communities, in both short and longer terms, is required.

Establishing MPAs will provide opportunities to not only monitor their performance but to conduct research on fish behavior, age-specific dispersal potentials, and productivity. In addition, fundamental information on life histories, stock structure, and population dynamics can be collected in MPAs. Manipulative experiments that involve mark-recapture approaches, or selective removals and additions of organisms, are possible in MPAs where potentially confounding effects of fishing are absent.

Costs and Benefits

There are costs and benefits associated with MPA-based management relative to more conventional fishery management approaches (Table 1, from NRC, 2001) and

these must be considered when MPAs are planned. Except in the case of collapsed stocks, there may not be economic incentive for MPAs or increases in profitability from MPA implementation and, in fact, profits may decline in the near term.

Table 1. Some costs and benefits associated with MPAs in fisheries management (from NRC 2001).

ISSUE	COST	BENEFIT
Yield	Decrease catch. Negative impacts on yields of other fisheries	Higher stock fecundity and recruitments. Lower bycatch
Displacement	Increased fishing pressure in open areas	Reduced effort. Protect essential fish habitat
Management	New research and monitoring needs	Better estimates of population parameters
Economics	Disproportionate impact on local communities	Insurance against stock collapse.
Non-market values	Loss of customary fishing areas and rights to access	Restores ecosystem, habitats and species

Essential Fish Habitat, Fisheries Ecosystem Plans and Marine Protected Areas

The need to define essential fish habitat (EFH) and to manage fishing to insure its protection was highlighted in the amended MSFCMA (1996); additional required actions and recommended research have been proposed in the draft M–S reauthorization now before the 107th Congress. A report of the Congressionally-mandated Ecosystems Principles Advisory Panel (NMFS, 1999) included many specific recommendations on ecosystem approaches to improve fisheries management. That Panel also proposed a major conceptual recommendation—that each Council develop a Fishery Ecosystem Plan(s) (FEP) within its region. A FEP is envisioned to serve as an umbrella plan under which individual Fishery Management Plans (FMPs) would sit and to which they must adhere. An FEP essentially defines the important ecosystem considerations that must be addressed in a FMP. Language in the newly drafted M–S Act reauthorization Bill promotes development of criteria and research plans for FEPs in Council regions.

The EFH and FEP concepts are closely allied and are related to evolving thought on how MPAs will fit into ecosystem-sensitive approaches for fisheries management. In my view, the pending M–S reauthorization does not need a National Standard that calls for MPA implementations by Regional Councils for fisheries management. However, the reauthorized Act would be well-served to explicitly recognize and encourage the designation of MPAs as a tool to protect critical habitats (EFH) and provide supportive management at the ecosystem level to insure conservation of the productive capacity of marine ecosystems (FEP) that can support sustainable fisheries.

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Mr. GILCHREST. Thank you very much, Dr. Houde.

And our next—I cannot see the name—Dr. Shipp is next on my list. Are you Dr. Shipp?

Dr. SHIPP. Yes, I am, Mr. Chairman.

Mr. GILCHREST. I guess the names are switched. No, maybe they are not. They are compressed; OK.

STATEMENT OF ROBERT SHIPP, CHAIR, DEPARTMENT OF MARINE SCIENCES, UNIVERSITY OF SOUTH ALABAMA

Dr. SHIPP. And I greatly appreciate that you pointed out that I am from the University of South Alabama and not the University of Alabama. It is a very touchy issue, and most of the time, there is an error there.

Mr. GILCHREST. To someone from Maryland, it makes almost no difference.

[Laughter.]

Mr. GILCHREST. But I guess if you are from Alabama, it is significant. It is like Kent County and Kent Island in Maryland.

You may begin, sir. Thank you.

Dr. SHIPP. Thank you.

I am going to digress a moment or two from my prepared statement to give a little background. Recently, I issued a paper on the pragmatic perspective on MPAs, and I was immediately branded as an anti-MPA person. And that is certainly not the case.

I served on the Gulf of Mexico Fishery Management Council for 9 years. I chaired the council when the Tortugas sanctuary was set up and was a very active proponent of that. However, I have raised some questions about the value of MPAs as far as their productivity and harvest are concerned, and those are the comments that I will offer today.

Establishment of MPAs may have numerous beneficial purposes. However, as a tool for fisheries management, where optimal and/or maximum sustainable yield is the objective, MPAs are generally not as effective as traditional management measures and are not appropriate for the vast majority of marine species. This is because most marine species are far too mobile to remain within an MPA and/or are not overfished. For those species which could receive benefit, creation of MPAs would have an adverse effect on optimal management of sympatric forms.

Eight percent of U.S. fish stocks in the EEZ are reported to be experiencing overfishing. The fin fish stocks included in this number are primarily pelagic or highly mobile species, movement patterns that do not lend themselves to benefit from MPAs. Thus, a small percentage, something about 2 percent depending on the mobility potentials, are likely to benefit from creation of these no-take

zones. However, many of these species have come under management within the last decade, employing more traditional fishery management measures and are experiencing recovery.

Establishment of MPAs are often intended as near proxies for a virgin stock. If so, several factors need to be kept in mind, and it might be helpful in gaining perspective to recall that some of these principles have been well-known for decades or longer though sometimes forgotten.

First, by definition, a virgin stock provides no yield. Therefore, a perfect proxy would be a negative in terms of management goals to produce an MSY or an OY. However, proponents of MPA usage for management purposes refer to the spillover effect of harvestable adults to adjacent areas. The impact of this spillover will always be less than that of a properly managed stock, which generates the optimum yield per recruit, again by definition.

Another claim is that larvae from MPAs will be a significant addition to the overall stocks. This may well be beneficial but only for a very seriously depleted stock. In other cases, larval production, always in excess of the carrying capacity of the habitat, does not normally relate to year-class strength; rather, density-dependent factors usually control ultimate recruitment to the harvestable stock.

While this principle has been the subject of scores of books and probably thousands of publications, it was espoused nearly 150 years ago by Darwin and is restated frequently in almost every fishery text.

MPAs can serve a positive function as a management tool in protecting breeding aggregations; in helping recovery of severely overfished and unmanaged insular fish populations with little connectivity to adjacent stocks and in protecting critical habitat which can be damaged by certain fishing methods.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Shipp follows:]

A REPORT TO THE FISHAMERICA FOUNDATION

BY ROBERT L. SHIPP, PH.D.

EXECUTIVE SUMMARY

Marine Protected Areas (MPAs) are portions of the marine environment which are protected from some or all human activity. Often these are proposed as a safeguard against collapse of fish stocks, although there are numerous other suggested purposes for their establishment. "No take" MPAs (hereafter referenced as nMPAs) are those from which no harvest is allowed. Other types include those where certain types of harvest are prohibited, which are reserved for certain user groups, or which are protected from other human activities such as drilling or dredging.

Establishment of nMPAs may have numerous beneficial purposes. However, as a tool for fisheries management, where optimal and/or maximum sustainable yield is the objective, nMPAs are generally not as effective as traditional management measures, and are not appropriate for the vast majority of marine species. This is because most marine species are far too mobile to remain within an nMPA and/or are not overfished. For those few species which could receive benefit, creation of nMPAs would have an adverse effect on optimal management of sympatric forms.

Eight percent of U.S. fish stocks of the Exclusive Economic Zone (EEZ) are reported to be experiencing overfishing. The finfish stocks included in this number are primarily pelagic or highly mobile species, movement patterns that don't lend themselves to benefit from nMPAs. Thus a very small percentage, something less than 2%, depending on mobility potentials, is likely to benefit from creation of these no-take zones. However, many of these species have come under management within

the last decade, employing more traditional fishery management measures, and are experiencing recovery.

MPAs (both "no take" and other types) can serve a positive function as a management tool in protecting breeding aggregations, in helping recovery of severely overfished and unmanaged insular fish populations with little connectivity to adjacent stocks, and in protecting critical habitat which can be damaged by certain fishing methods.

INTRODUCTION

Concept of MPAs

In recent years, a great deal of interest has been expressed in the establishment of Marine Protected Areas (MPAs), marine "no take" areas, or marine sanctuaries (e.g. National Research Council: "Marine Protected Areas: Tools for Sustaining Ocean Ecosystems,2001; National Resource Defense Council: "Keeping Oceans Wild: How marine reserves protect our living seas, 2001") This interest has been spurred by the frequent references to depleted fish stocks, and continued decline in marine fishery resources.

Proponents of so called "no take" Marine Protected Areas (nMPAs) have described the benefits to include potential as a fishery management tool as well as several other related advantages, specifically, conserving biodiversity, protecting (coastal) ecosystem integrity, preserving cultural heritage, providing educational and recreational opportunities, and establishing sites for scientific research (Houde et al., 2001). In addition, other benefits suggested include enhancing ecotourism, and reducing user group conflict (e.g. divers and harvesters).

The concept of nMPAs is initially attractive, and will no doubt elicit a great deal of support and discussion among various groups interested in protecting marine habitats. However, the many offered benefits described above often overlap, and become intertwined in the discussions which ensue. A fishery management tool is one that sustains and/or increases through time the yield of a fish stock, or several sympatric stocks of an ecosystem. If nMPAs are to be considered as a management tool, then that goal or objective, sustained and/or increased yield, needs to be clearly stated, and distinguished from other, more theoretical goals.

Traditional Management Tools

Traditional management tools generally focus on reducing effort, enhancing stocks from hatchery operations, and protecting critical habitat. Effort reduction includes bag and size limits (including sometimes slot limits), quotas, seasonal and/or areal closures, gear restrictions, and by-catch reduction. These have been successful for more than a century in freshwater environments. Their use in marine habitats has only become widespread in the United States in recent decades, especially since passage of the Fishery Conservation and Management Act in 1976. Hatchery operations and stocking have also been primarily a freshwater endeavor, although recent efforts to stock some marine species have been attempted and yet to be evaluated over the long term. Protection of critical marine habitats has become an issue of extreme concern and is the focus of current efforts on the part of all Fishery Management Councils, as required in the most recent reauthorization of the Sustainable Fisheries Act. Use of MPAs for this purpose is discussed later in this paper.

Purposes of MPAs

In order for nMPAs to function as a management tool for marine fisheries, there needs to be an examination in specific instances and with specific stocks to determine the potential benefits. This is especially true when stakeholders are currently so involved in management decisions that impact their livelihood. In their work on no-take reserves (Murray et al., 1999), the authors list guidelines for these reserves, including first:

1. Reserves should have clearly identified goals, objectives, and expectations.
   a) Clearly identify and describe the purposes of each reserve.
   b) Clearly identify the species, communities, and habitats to be protected.
   c) Clearly identify the projected role and contribution of each reserve to the network.

I am in total agreement with these guidelines. For this reason, a systematic approach, detailing the potential benefits or lack thereof of nMPAs on managed stocks is justified, and is the intent of this paper. It is not the intent of this paper to pass judgment on the benefits of MPAs ("no take" or MPAs of other design) on any of the other stated objectives (e.g. conserving biodiversity, study sites for ecosystem research, ecotourism sites, protection of habitat from destructive fishing methods, protection of habitats from other harmful anthropogenic activities such as drilling, coastal development etc.). These are socioeconomic or scientific questions that may

have socioeconomic and/or scientific consequences, but are distinct from evaluating scientifically nMPAs as a fishery management tool.

METHODOLOGY

The procedure followed here is to develop a comprehensive list of economically (commercial and recreational) important finfish from the mid to south Atlantic, the Gulf of Mexico, and Pacific U.S. coasts (shellfish are excluded here because of the radical differences in their life history, harvest methods, etc.). For each species in the list, determine the status of the stocks (underutilized, fully utilized, over utilized, unknown). Then review their life histories, especially movement and/or migratory patterns, and make a judgment as to the possible benefits that may be conferred by establishment of an nMPA.

Determination of nMPA impacts

NMPAs are predicated on two fundamental components: keeping harvesters out and keeping the species in. The first of these is primarily an enforcement, compliance, and education issue and not to be discussed herein. The second is wholly a scientific issue, that is, whether the biology of the species is such that they will remain within an nMPA for a period of their life long enough to accrue the protection desired.

Studies assessing the management potentials of nMPAs recognize this, and the "keeping species in" component is critical in modeling efforts. For example, Nowlis and Roberts (1998) state that their models "included the key assumptions that adults did not cross reserve boundaries and that larvae mixed thoroughly across the boundary but were retained sufficiently to produce a stock-recruitment relationship for the management area."

In addition, for an nMPA to be an effective management tool, the clear implication is that management is needed. Thus, the stocks must be overfished, or overfishing is occurring or likely to occur, and the stocks may be approaching an overfished condition. There are formal and legal definitions for these terms, but briefly, an "overfished stock" is one whose current biomass is below that needed to maintain current harvest rates, and "overfishing" refers to a rate of fishing pressure that will lead to the overfished condition, even though current biomass of that stock is adequate to sustain maximum sustainable yield (MSY) if properly managed.

If the stocks are healthy, and projected to remain so, that is they are neither overfished nor is overfishing occurring, the need for nMPAs as a management tool is nil. This is also true if the preferred but complex ecosystem management strategy is employed, and no species within the complex is overfished or experiencing overfishing. In fact the literature is clear on this point, that if the stocks are healthy, nMPAs at best are yield neutral or will reduce harvest in some ratio to the size of the nMPAs (e.g. Polachek, 1990; DeMartini, 1993; Holland and Brazee, 1996; Sladik and Roberts, 1997; Botsford et al., 1999; Hastings and Botsford, 1999; R. Hilborn, U. of Wash. pers. com.).

Current status of fisheries

So it is first important to gain some perspective on the extent of overfishing in U.S. waters before we can assess the possible benefits of nMPAs. In the latest Report to Congress (NMFS 2001), 905 fish stocks in the EEZ were addressed, including both finfish and shellfish. Ninety two stocks (10%) were determined to be overfished; seventy-two stocks (8%) were found to have overfishing occurring. Of these, 57 stocks (6.3%) were found to be both overfished and are experiencing overfishing. These percentages are somewhat misleading in that there were a large number of stocks for which the stock status was undetermined. However most of these were economically less important and less targeted species.

Determination of Potential Benefits

In determining possible benefits for each species, while movement patterns and stock condition are primary considerations, additional parameters include any which may impact the management of the species. Examples include utility and effectiveness of alternative management measures, presence of critical habitat, by-catch mortality, release mortality, and recruitment (i.e. larval dispersal) characteristics.

The species movement patterns of course relate to the proposed dimensions of an nMPA, but in most discussions, vast area nMPAs, covering extents within which a migratory species or all life history stages of sedentary species would be contained, are not proposed. Exceptions exist in dire cases, such as the major areas established off the upper western North Atlantic shelf, where an attempt is being made to recover the depleted ground fish stocks (NOAA, 1999). In fact, these can also be interpreted as a proxy for effort reduction on a collapsed fishery.

There have been suggestions that certain areas which serve as major migratory pathways or important spawning areas for pelagic species be considered as nMPAs (e.g. NOAA, 1999). These in fact will be discussed as critical habitat parameters, but are not what are generally considered as an nMPA, as these may be seasonal, or even variable in locale, depending on certain physical conditions.

The basic document employed for this list determination is the aforementioned "Report on the Status of U.S. Living Resources" published by the U.S. Department of Commerce for the year 1999 (NOAA, 1999) and "The Report to Congress. Status of Fisheries of the United States" (NMFS, 2001). These reports provide species lists for each of the coasts, and their current stock status. This is supplemented by including additional species which may fall under individual state management, or have some economic importance external to the parameters of the Federal documents. Where these species have been added, a brief commentary on the rationale to do so is included.

Thus the concern often expressed is for troubled species, and the purpose of this report is to determine if those species are potential beneficiaries of nMPAs.

Mid to south Atlantic species

Anadromous Species

NOAA (1999) lists five managed anadromous species of the Atlantic Coast: Striped bass, American shad, alewife/blueback, sturgeons, and Atlantic salmon. All these stocks are considered overfished except striped bass.

Striped bass (Morone saxatilis) suffered severe recruitment failures in the 1970s, but restrictive management measures implemented in the 1980s and some good recruitment levels have restored the stocks. For the other species, agricultural and industrial development and damming of rivers are cited as the major impediments to rebuilding. And while improvements of these riverine habitats may be necessary for recovery of these stocks, none of these species can be considered as potential beneficiaries of an nMPA.

Atlantic Highly Migratory Species.

NOAA (1999) lists 10 categories of highly migratory fish stocks: yellowfin tuna, bigeye tuna, albacore, skipjack tuna, bluefin tuna, "other" tunas, swordfish, blue marlin, white marlin and sailfish. Of these, all are considered over exploited, except yellowfin (fully exploited), skipjack (possibly fully exploited) and other tunas (unknown). While there is grave concern for the future of these severely overfished stocks, their highly migratory nature and requirements for international quota regulations preclude them from receiving significant benefit from an nMPA. However, identification of critical spawning areas may justify seasonal/areal closures in the future.

Atlantic Shark Fishery.

There are thirty-four species of sharks listed in the Atlantic shark fishery by NOAA (1999), however these are grouped into only three categories: large coastal, small coastal, and pelagic. The large coastal species as a group are considered overfished, although lack of knowledge of the individual species status is a concern. Small coastal sharks are thought to be fully utilized, and their stock levels above that necessary to maintain a long term potential maximum yield. The exploitation status of the highly pelagic grouping is unknown. But practically all shark species for which tagging studies have been implemented show extensive movement patterns, and as a result, are unlikely to benefit from nMPAs. However, recent information on critical nursery areas for some species may warrant seasonal/areal closures or other measures to protect critical habitat of juveniles.

Summer Flounder.

Along the New England and mid Atlantic coast, summer flounder (Paralichthys dentatus) of the mid Atlantic states is a heavily exploited species, both commercially and recreationally. The species undergoes an offshore spawning migration from late summer to mid-winter, and the larvae and post-larvae drift inshore, where metamorphosis is completed, and the juveniles utilize eelgrass beds or similar habitats. The extensive migratory patterns minimize potential benefit to the species by nMPAs, however, consideration should be given to protection and even expansion of the required juvenile habitat.

Other south Atlantic and Gulf of Mexico stocks

Atlantic and Gulf of Mexico Migratory Pelagic Fisheries.

Because of their migratory patterns which ingress between both the Gulf and south Atlantic, Gulf and Atlantic migratory species are included together. The spe-

cies listed include dolphinfish, king mackerel, Spanish mackerel, cobia, and cero mackerel. To this list is added wahoo, because both Management Councils (the South Atlantic Fishery Management Council [SAFMC] and the Gulf of Mexico Fishery Management Council [GOMFMC]) have recently begun an assessment and management plan for this species.

Of these seven species, only the Gulf stock king mackerel have been considered overfished, although the most recent stock assessment has concluded that this stock has now recovered to the fully utilized level (Dr. Will Patterson, chair GOMFMC Coastal Migratory Stock Assessment Panel, pers. com). Dolphinfish, cobia, cero, and wahoo fishery utilization levels are unknown. But in any case, these species are so migratory that none could be considered to benefit by an nMPA.

Atlantic and Gulf of Mexico Reef Fisheries.

About 60 species of reef fishes are managed in the South Atlantic and Gulf EEZ. For the vast majority of these, stock assessments have not been performed and life history data, including movement patterns, are also unknown. Thus any consideration of nMPA benefits for these species is pre mature. However, in recent decades, great concern has been expressed for several of the more valuable species, and more is known of their stocks and life history than the lesser known forms. These will form the analytical basis for the potential benefits of nMPAs, and for the present, can be considered as reasonable proxies for the other less studied species.

The species included in this discussion are: jewfish (=goliath grouper), Nassau grouper, gag grouper, red grouper, red snapper, vermilion snapper, mutton snapper, greater amberjack, red porgy, and gray triggerfish. Each of these is treated individually in regard to their stock status and current trends, life history parameters, and potential benefits of nMPAs.

Goliath grouper (Epinephelus itajara) has been a species of great concern for more than a decade. In fact, a total harvest prohibition was placed on this species in the late 1980s. Since then, the population has experienced significant recovery (A. E. Eklund, NMFS, pers.comm.), and has led many commercial and recreational fishermen to express concern that its predatory behavior may negatively impact populations of sympatric reef species, especially spiny lobsters. At the recent (January 2002) meeting of the Reef Fish Advisory Panel (RFAP) of the GOMFMC, several members noted that these stocks have rebounded so strongly and are impacting their prey species so heavily that the Panel voted unanimously to request that the Council consider a controlled harvest to determine the status of the stocks.

Nassau groupers (Epinephelus striatus) are found only in the most extreme southern US, primarily the Florida Keys (Sadovy and Eklund, 1999). The status of their stocks has also been of great concern, especially because of their well documented spawning aggregations (Colin, 1992) which make them vulnerable to intense harvest at that time. For this reason, protection of these sites during spawning is certainly a positive function of an nMPA. Whether these sites should be so designated permanently would require additional studies to determine if habitat requirements were threatened by harvest activities during other times. In addition, designation of areas other than the spawning sites as nMPAs for protection of Nassau would not be beneficial, since they would leave those areas during spawning, and thus become vulnerable to capture (Bolden, 2000).

Gag grouper (Mycteroperca microlepis) is an extremely important commercial and recreational species, occurring along the entire mid- Atlantic and Gulf coasts. There has been a great deal of study on this species (see Turner et al., 2001) because of its economic importance, fears for the condition of the stock, the formation of spawning aggregations, its protogynous life cycle, and the possibility of a major shift in sex ratios (fewer males) due to overfishing and the extremely aggressive habits of the males during this period (Coleman et al., 1996). Several regions off the big bend area of Florida were proposed as nMPAs by the GOMFMC for this species during the spawning period (late winter-early spring), but prevented from implementation by subsequent litigation. However, the occurrence of spawning aggregations and concern over sex ratios does argue for protection in those areas well documented as spawning sites. Although the current stock assessment indicates that the stocks are not overfished (GOMFMC, Stock Assessment Panel [SAP], 2001), gag is definitely a potential candidate for protection at aggregate spawning sites and during spawning periods.

Red grouper (Epinephelus morio) range from Massachusetts to Brazil, and are most abundant on the west Florida and Yucatan shelves. They're found from coastal estuaries to the outer continental shelf (Robins et al., 1986; Shipp, 2000) and will likely be declared overfished during the year 2002 (Dr. Jim Cowan, chair, GOMFMC, SAP), although there continues to be a great deal of uncertainty regarding the status of the stocks, due in large part to historical catch by the Cuban fleet

through the 1960s. In addition, little is known about the migratory patterns of this species. But there is no indication that they are any more sedentary than other groupers, and the juveniles occur in nearshore waters, moving offshore as they approach maturity. It is possible that adults form small breeding aggregations (Coleman et al., 1996), but whether these occur in well defined areas is not known. If such areas are located, they could possibly be designated as an nMPA during spawning periods.

Red snapper (Lutjanus campechanus) has doubtlessly become the most controversial finfish species in the Gulf of Mexico, less so in the south Atlantic. It's high market value, favor by recreational fisherman, and the vulnerability of juveniles to shrimp trawls, has resulted in stakeholder conflicts on many fronts. The species was declared as severely overfished in the late 1980s and early 1990s (Goodyear, 1995; Schirripa and Legault, 1999). This resulted in numerous harvest restrictions, including minimum size limits, seasonal closures, trip limits for commercial fishermen, bag limits for recreational fishermen, and mandates for by-catch reduction devices by the shrimp fleet.

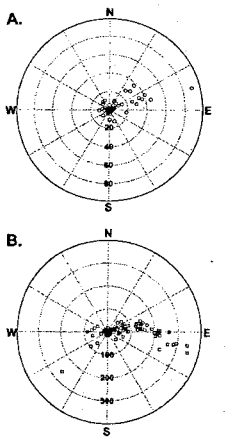

Figure 1. Polar diagrams of red snapper movement for (A) fish not at liberty during Hurricanes Opal and Georges and (B) fish at liberty during those hurricanes. Note scaler differences, in kilometers. From Patterson et al, 2001

Because of these factors, and the fact that it's a reef species thought to have relatively sedentary habits, several recent papers on red snapper have cited the species as one that might be benefitted by nMPAs (Bohnsack,1996; Fogarty et al. 2000, Houde, 2001). However, on closer examination, red snapper would likely not benefit. Recent papers describing results of tagging studies (Watterson et al., 1998; Patterson et al. 2001) demonstrate that while strongly reef associated, red snappers exhibit slow movement away from tagging sites under normal conditions, and extensive movement as a result of tropical cyclones, a very frequent occurrence throughout the entire range of the species Figure 1). Thus, a "permanent" red snapper stock in an nMPA would be largely relocated to other areas with each of these events.

In addition, recent model projections of snapper recovery (Goodyear, 1995; Schirripa and Legault, 1999) cite the need for very substantial (40%–80%) shrimp trawl by-catch reduction of age 0 and 1 juveniles. Red snapper larvae remain in the plankton for two weeks or more. Thus any potential contribution of larvae to the overall population from and nMPA stock would be subjected to the same mortality over most of its range. But despite the stresses experienced by the stock, red snapper appear to have begun to recover. With the implementation of the traditional management measures described above, quotas and CPUE have increased consistently during the last decade.

Vermilion snapper (Rhomboplites aurorubens) is a moderately important reef species of the Gulf and south Atlantic. The stock assessment panels have not been able with certainty to evaluate stock status. However, in the Gulf, it is likely that this species may be heading toward an overfished condition (J. Cowan, chair, GOMFMC Stock Assessment Panel, pers. comm.), although the most recent assessment contained so many uncertainties that the GOMFMC Reef Fish Advisory Panel in 2002

recommended "status quo" on setting a quota until a more reliable assessment could be developed. The species has been managed primarily by a minimum size limitation. There is little information as to its migratory or movement patterns, so the benefits of an nMPA for this species cannot be determined.

Mutton snapper (Lutjanus analis) is known to form distinct spawning aggregations. One of the best known is the Riley's hump area near the Dry Tortugas in the Florida Keys. This area is protected during the spawning season, and except for some occasional violations and attendant enforcement problems, the protection will likely benefit the species.

Greater amberjack (Seriola dumerili), though listed as a reef species, is better considered a coastal pelagic. Although frequenting reef areas, this active species is very mobile, and its movements, though not extensive long range migrations, do traverse hundreds of kilometers on a regular basis (Ingram, et al., in press), and thus is an unlikely candidate to benefit from any but the most expansive nMPAs.

Red porgy (Pagrus pagrus) ranges on both sides of the Atlantic in temperate and tropical seas. It favors live bottom habitats. It is a species of some concern regarding the health of the stocks, especially in the south Atlantic U.S. coast. Recent increases in fishing pressure have resulted in a greatly reduced stock, and a call for reduced fishing mortality. Earlier tagging studies did not indicate extensive migrations. The species is currently under management by the SAFMC, and effort restrictions have been put in place to reduce harvest. Contingent on the results of this management and additional data on population movements, the red porgy is a species that could possibly benefit from an nMPA until stocks are returned to a level more manageable by traditional fishery methods. However, the population appears to be experiencing a substantial rebound (Dr. Robert Mahood, Exec. Dir. SAFMC, pers. com.), and a new stock assessment will be completed in June of 2002.

Gray triggerfish (Balistes capriscus) is a temperate-tropical species found on both sides of the Atlantic. The species has received additional fishing pressure in recent years, probably resulting from more stringent management regulations on co-occurring species, especially red snappers and groupers. However, the stocks are not considered overfished, but as a precautionary move, a 12" minimum TL size limit has been implemented by most management agencies. Recent studies (Ingram, 2001) suggest that gray triggerfish are more sedentary than previously thought, more so than red snapper, but nevertheless do display some limited movement. Should future fishing pressures indicate additional limitations on harvest, this species might be the best candidate among the fishes discussed here to benefit from an nMPA, especially given that recent stock assessment data indicate that gray triggerfish may be experiencing local overfishing in some locations in the Gulf of Mexico (J. Cowan, chair, GOMFMC Stock Assessment Panel, pers. comm.).

Other Snapper/Grouper Species.

In the south Atlantic, there are nine species of snappers and groupers (gag grouper, red snapper, speckled hind, snowy grouper, Warsaw grouper, golden tilefish, yellowtail snapper, red grouper, and black grouper) that are considered overfished and overfishing is occurring. The SAFMC has initiated rebuilding plans by imposing catch restrictions on all these species. These plans are generally 10–15 year plans, and most are about five years away from completion. If these traditional management measures fail, nMPAs might be appropriate for some or all of these species. However, migratory patterns of these forms are at present poorly understood. Therefore, establishment of nMPAs at this time is pre mature.

There are an additional 19 snapper/grouper species in the South Atlantic, as well as scores of sympatric species under management (e.g. grunts, porgies), for which the stock status is unknown.

Southeast Drum and Croaker Fisheries.

Black drum, Atlantic croaker, spot, red drum, seatrouts, and kingfishes (whitings) are included in this grouping. Atlantic croaker and red drum are considered overfished, while the other species' status is considered unknown. All these species spawn in higher salinity waters or offshore, and the young enter estuaries where they reside until reaching sexual maturity.

Of the two overfished stocks, management plans are in place for the recovery of both. Croaker (Micropogonias undulatus) stocks suffer greatly from by-catch discards, which include about 7.5 billion individuals killed annually (NOAA 1999). Improvement in gear designs will likely reduce this mortality and lead to recovery of the species.

A total harvest ban in Federal waters by the South Atlantic and Gulf of Mexico Councils has been put in place for red drum (Sciaenops ocellatus). In addition, the states have implemented various restrictive harvest measures. The results suggest

that these conservation measures have substantially increased the escapement of juveniles, and the offshore adult stocks are increasing.

Thus there appears no benefit of nMPAs as a management tool for the southeast drum and croaker fisheries.

Other Gulf and south Atlantic species under some form of management include striped mullet, tarpon, and snook. Only regional assessments exist for these species, but none is considered overfished on a range-wide basis, and all have moderate to long range migratory patterns, and would not benefit from traditional nMPAs. However, the juvenile phase of tarpon may benefit from some nursery area protection (Shipp, 1986).

Pacific Coast fisheries (excluding Alaska)

Pacific Coast Pelagic Species.

There are five species included within the Pacific pelagic group (northern anchovy, Pacific sardine, jack mackerel, chub mackerel, and Pacific herring, NOAA, 1999). All are listed as under or fully utilized, none overfished. Therefore, because of their healthy stock conditions and pelagic life history, they would receive no benefits from creation of nMPAs.

Pacific Coast Groundfish Fisheries.

The Pacific groundfish assemblage is a diverse group of species, principally flatfishes and rockfishes. These are mainly long lived, slow growing species, subject to harvest by both commercial and recreational fishers. Included are about 60 species of rockfishes, principally Sebastes and several species of thornyheads (Genus Sebastolobus), several cods, the sablefish (Anolopoma fimbria) and the lingcod (Ophiodon elongatus). Recently, life history data were provided to the Pacific States Marine Fisheries Commission of the nearshore fishes of California (Cailliet, 2000). This, along with several supplementary references, and combined with the NOAA document (1999) and the Report to Congress NMFS 2001) provide the background for determination of the possible impacts of nMPAs on these species.

The Pacific whiting (=Pacific hake, Merluccius productus), is a mid to moderate depth species, with relatively extensive movement patterns. It is considered fully but not over exploited, and with extremely variable year class strengths. Because of these factors the species is not likely to benefit from establishment of an nMPA.

The sablefish (Anaplopoma fimbria) is an important commercial species, ranging from Japan and the Bering Sea to Baja. The stock status is considered fully exploited, and stock levels are below optimum. However, it is a deep water, often migratory species, thus not likely to benefit from an nMPA.

The lingcod (Ophiodon elongatus) is a large member of the greenling family, ranging from Kodiak Island to southern California, but is most abundant in the northern part of its range. It is an extremely important recreational and commercial species, with a high food value, although representing only about 2% of the Pacific Coast groundfish catch. This species is considered to be over exploited, with stock levels well below that necessary to maintain the long term projected yield. The species is relatively sedentary, usually in rocky reefs at depths of 10 to 100 m. It is a nest building species, and the males become extremely aggressive during this time, particularly vulnerable to attack by marine mammals. The species is also cannibalistic.

The life history and stock condition indicate that this species could benefit by an nMPA in the more northern part of its range. However, other management measures have been put in place, including protection of spawning and nesting sites during spawning season, minimum size requirements to ensure at least one spawn before subject to harvest, and restricted catch limits through recreational bag limits and commercial quotas. Though recovery is likely to be slow because this is a long lived species (up to 25 years), these measures are thought to be sufficient to effect recovery (Alaska Dept. of Fish and Game, 1994).

Pacific cod (Gadus macrocephalus) is a wide ranging, highly migratory species of commercial importance in the North Pacific. It is considered underutilized, although stock status and long term potential yield are unknown. Therefore, the species would not benefit from establishment of an nMPA.

Pacific Flatfishes.

Pacific halibut (Hippoglossus stenolepis) is a carefully managed species, with its center of abundance in the Gulf of Alaska. Landings from the U.S. Pacific Coast (excluding Alaska) average about 570 metric tons, representing a little more than 1% of the total harvest (NOAA, 1999). The species is well managed throughout its range by traditional methods, and recent harvest has been near record. Thus the species would not likely benefit from establishment of an nMPA.

The status of four other U.S. Pacific Coast flatfish species (arrowtooth flounder [Atheresthes stomias], Dover sole [Microstomas pacificus], English sole [Pleuronectes vetulus], and petrale sole [Eopsetta jordani]) are considered individually while the many additional flatfishes are grouped together (NOAA, 1999). Of these four, none is listed as overfished, and all are wide ranging with extensive offshore movement patterns. For this reason, none would benefit from nMPAs. For the many remaining flatfish species, their stock status is unknown.

Rockfishes.

There are about 65 species of rockfishes endemic to the U.S. Pacific coast, most in the genus Sebastes. They live in a diversity of habitats, from clean bays, to depths greater than 400 M. They are long lived species, with some living well over 50 years. Thus, annual exploitation to attain the management goals of 35–40% spawning biomass per recruit is often as low as about 5–10%. In recent years, the surplus present in most of these stocks has been fished down, resulting in reductions in recommended annual harvest (NOAA, 1999).

In its report to Congress, NMFS (2001) lists 52 species of rockfish. For four species (Pacific ocean perch [Sebastes alutus], bocaccio [S. paucispinus], canary rockfish [S. pinniger], and cowcod [S. levis], all but the latter are major stocks) the stocks are overfished but overfishing is not presently occurring and rebuilding programs are in place or under development. These species are all wide ranging forms with extensive portions of their populations in very deep water. Thus for fishery management purposes, nMPAs are likely not needed Only nMPAs of impractical extent both longitudinally and bathymetrically would have any impact on the stocks as a whole.

For three species (darkblotched rockfish [Sebastes crameri], silvergrey rockfish [S. brevispinis], and yelloweye rockfish [S. ruberrimus], all major stocks) overfishing is occurring, but for the former species the stocks are not currently overfished, and for the latter two stock conditions are unknown. Reduced mortality will be required, but currently, rebuilding plans are not yet in place. These three are also very wide ranging, from the Bering Sea to southern California, and out to depths of well more than 500 M, thus nMPAs would be impractical as a management tool. And in fact, due to the bathymetry of the eastern North Pacific coast, many of the areas inhabited by rockfishes are such as to prevent extensive fishing effort, or create a "natural refuge" (see Yolklavich et al. below).

For eight species (seven of which are major stocks) for which assessments exist the stocks are not overfished, nor is overfishing occurring. For the remaining species, most of which are minor stocks, their status and rate of fishing mortality is unknown. Therefore, particular management measures are premature.

The Pacific Fishery Management Council has implemented limits for individual vessels, as well as other measures in an attempt to maintain a year round harvest for most rockfish species.

Life history data and stock assessments for most species are not yet determined. Cailliat (2000) lists data on about 30 species, and about half are known to be resident species. Of the overfished or species experiencing overfishing, movement data are available only for the canary rockfish which is considered transient/resident, with tagged movements of over 259 km documented, and the yelloweye, which is considered a resident species.

General Life History Comments Regarding Rockfish.

In their study of the Soquel Submarine Canyon, off Monterey California, (Yoklavich et al., 2000) suggested that "rock outcrops of high relief interspersed with mud in deep water of narrow submarine canyons are less accessible to fishing activities and thereby can provide natural refuge for economically important fishes." Their study was represented by 52 fish species, of which rockfishes were represented by a minimum of 24 species. In addition, they concluded that "There was remarkable concordance between some of the guilds identified in Soquel Canyon and the results of other habitat-specific assessments of fishes along the west coast of the United States from central California to Alaska." Certainly this suggests that there is an inherent control of fishing effort in these habitats and consideration of more extensive areas designated as nMPAs is pre-mature and likely unnecessary.

Soh et al. (2001) studied the role of marine reserves on Alaskan rockfishes. Although Alaska is beyond the scope of this report, the findings are likely applicable. While predicting that harvest refugia (=MPA) can be used to greatly reduce discards and serial overfishing, they state that the effectiveness of marine refugia "in fisheries management is poorly understood and concepts regarding their use are largely untested."

DISCUSSION

NMPAs may serve many purposes, as described above. But when intended to serve as a fishery management tool, there are several situations for which they may be extremely beneficial, and many others for which more traditional methods are much preferred. These are reviewed briefly as follows.

Benefits of nMPAs as management tools

NMPAs can have a strong beneficial impact for fishery management during periods of active spawning by aggregations, when species may be especially vulnerable to harvest, and when certain components of the stock (e.g. large male gag grouper) may be disproportionately liable to capture. This can lead to imbalanced sex ratios which can further jeopardize a stressed stock. The utility of these is likely to be seasonal, and normally would not require year around catch restrictions.

In instances where a stock is severely overfished and subject to little or no management, an nMPA can be used along with other measures to more rapidly replenish populations. This is especially true in isolated, insular populations (e.g. Roberts et al., 2001, for St Lucia) which are not strongly connected to proximal populations for replenishment.

Where habitats are damaged by fishing practices, establishment of nMPAs may help ensure habitat recovery. This is useful when these habitats, such as submerged aquatic vegetation, reef structures or other hard bottom habitat, are critical for vulnerable life stages. Oftentimes, however, gear restrictions can be enacted to lessen the social impact that would result in declaration of a total no-take zone.

NMPAs may also be beneficial where ecosystem management is employed in fisheries (primarily of near sedentary species) where by-catch of non-targeted species has become excessive, or conversely, where a protected species has reached population levels which increase natural mortality rates of targeted species, preventing a reasonable harvest (see comments on Goliath grouper, above). An nMPA will allow some version of dynamic equilibrium to return. When the equilibrium has been reestablished, then alternate, more traditional management actions may be desirable to allow yield from the system. However, ecosystem based management is still in its infancy, and much research needs to be done before tested management principles can be established.

Liabilities and "non benefits" of nMPAs as management tools

When establishment of an nMPA is intended as a near proxy for a virgin stock, several factors need to be kept in mind. And it might be helpful, in gaining perspective, to recall that some of these principles have been well known for decades or longer, though sometimes forgotten. First, by definition, a virgin stock provides no yield. Therefore a perfect proxy would be a negative in terms of management goals to produce an MSY or OY. However, proponents of nMPA usage for management purposes refer to a "spillover effect" of harvestable adults to adjacent areas. The impact of this spillover will always be less than that of a properly managed stock, which generates the optimal yield-per-recruit, again, by definition. These models are discussed in numerous classical and modern texts (e.g. Rounsefell, 1975; Iverson, 1996),

The issue of spillover is addressed briefly by Houde et al. (2001). The authors describe the difficulty of direct confirmation of spillover effects, and suggest models may be more useful in understanding how marine reserves function in a regional context. But they also note that those conclusions are limited by underlying assumptions on which the model is based. For species with low mobility, the spillover is minimal, yet these sedentary species are the very ones for which an nMPA is supposedly most effective.

Another claim is that larvae from an nMPA will be a significant addition to the overall stocks. This may be beneficial, but only for a very seriously depleted stock. In other cases, larval production, always in excess of the carrying capacity of the habitat, does not normally relate to year class strength. Rather density dependent factors usually control ultimate recruitment to the harvestable stock. While this principle has been the subject of scores of books and probably thousands of publications, it was espoused nearly 150 years ago by Darwin and restated frequently in most every fishery text (e.g. Gulland, 1977; Rothschild 1986).

And much more recently, data presented by the GOMFMC Coastal Pelagic Stock Assessment Panel (January 2002) re emphasizes for very practical management purposes, such as in the case of Gulf king mackerel, that egg production does not correlate to an increase in stock size, the panel stating: "recruitment is assumed to increase to some level of spawning stock, and then to remain at the average recruitment for higher spawning stock values (Figure 2)."

Stocks within an nMPA

There are numerous examples in the literature of stock increases within an nMPA (e.g. Johnson et al., 1999; Roberts et al., 2001). However, one must not forget what the point is here in regard to yield. While effective nMPAs may support a stock with relatively greater biomass, perhaps larger individuals, and a higher spawning potential ratio (SPR), this portion of the stock has been removed from harvest. Therefore, the overall yield is reduced by whatever fraction could be contributed to overall harvest from this protected stock, and mitigated only by the possibility of spillover or larval contribution, as discussed above.

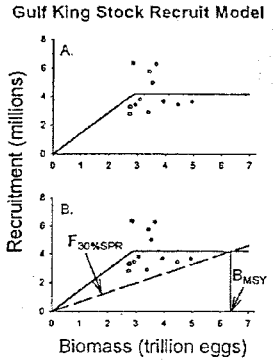

Figure 2. A) Spawner recruit model estimated for Gulf king mackerel. B) Bmsy is estimated at the intersection of the spawner recruit model and F30%SPR replacement line.

Far better would be to impose more traditional methods to restore the overfished stocks, as has been done for many species. This becomes more and more successful as we adopt more precautionary harvest levels, improve our methods of stock assessment, stock/recruit relationships, and life history information.

Current plans or suggestions regarding closure of large areas of the US mainland continental shelf to harvest are simply not scientifically supportable from a fishery management perspective. The suggestion, for example, that as much as 40 % of the Southern California shelf should be designated an nMPA is totally without merit from a fishery harvest perspective. Though there may be other aesthetic benefits, such a closure would severely reduce harvest potentials, shift effort to other areas, and likely have a substantial negative economic impact on both the commercial and recreational fishing industries.

Pragmatic perspective

Examination of the scores of coastal species from the mid to south Atlantic, Gulf, and U.S. Pacific coasts reveals that very few species are known to be both overfished and/or experiencing overfishing, and are sedentary. Those candidates that are in both categories, and may possibly benefit from and nMPA, are found in widely differing geographic ranges, with optimal potential nMPA sites far apart (e.g. lingcod and surf perch in the Pacific, red porgy in the Atlantic and gray triggerfish in the Gulf). To establish an nMPA for the benefit of those few species would remove harvest potential of the scores of sympatric forms, most of which are not overfished. And while this may not reduce the overall harvest of these species, it would definitely reduce efficiency and increase fishing effort in other, adjacent areas.

Far better would be to impose more traditional methods to restore the overfished stocks, as has been done for many species. This becomes more and more successful as we adopt more precautionary harvest levels, improve our methods of stock assessment, stock/recruit relationships, and life history information.

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Mr. GILCHREST. Thank you, Dr. Shipp.

Mr. Gilmore?

STATEMENT OF JIM GILMORE, DIRECTOR, PUBLIC AFFAIRS, AT-SEA PROCESSORS ASSOCIATION

Mr. GILMORE. Thank you, Mr. Chairman and Congressman Underwood for inviting the At-Sea Processors Association to testify today. I am Jim Gilmore, the director of public affairs for the association.

The catcher-processor fleet represented by APA participates in the nation's largest fishery, the Bering Sea-Aleutian Islands Groundfish Fishery, as well as the West Coast Pacific Whiting Fishery. Participants in the North Pacific fisheries have followed closely but anxiously the emerging national debate on Marine Protected Areas. The breadth and scope of the MPA Executive Order issued by President Clinton is still unclear, and the impacts on fishing communities are unknown.

A March 2002 report issued by NOAA finds that policymakers must still undertake the basic task of, quote, identifying MPA goals and defining MPA terminology. It is difficult for fishing organizations to develop a coherent position on MPAs absent a definition of what an MPA is.

However, it is our view that MPAs should be broadly defined to include any marine area that is closed permanently or seasonally or an area in which some or all types of fishing gear are restricted. The purposes for such closures or restrictions, or both could include fish stock management, by-catch avoidance, gear conflict reduction, protection of endangered species or protection of sensitive habitat.

Using those guidelines, the map on page 2 of my written testimony shows that in the Bering Sea-Aleutian Islands Management Area, Federal fishery managers have already created Marine Protected Areas encompassing more than 30,000 square miles of ocean. An additional 45,000 square miles of the Gulf of Alaska are managed as Marine Protected Areas.

While the MPA debate is in its seminal stages at the national level, for two decades the North Pacific Council has been using MPAs to achieve management and conservation objectives, reflecting an ecosystem-based management approach. As a result of the essential fish habitat provisions of the 1996 Sustainable Fisheries Act, there is a new focus on MPAs at the regional fishery management council level. The EFH mandate directed councils to describe and identify essential fish habitat and fishery management plans; identify adverse impacts from fishing on such habitat; and take necessary measures to ensure conservation and enhancement of EFH.

In some regions, the focus of EFH might be to restrict fishing in habitat areas of particular concern to allow fish populations to rebuild. That has not been the emphasis in the North Pacific, where fish stocks are already healthy and robust.

Efforts by the North Pacific Council to implement EFH requirements are focused more on identifying habitat areas of particular concern and developing mitigation measures to protect sensitive habitat areas from adverse impacts of fishing. This is a difficult and time-consuming task, and the council is allocating substantial resources in a multi-year project that could result in a significant expansion of MPAs in the North Pacific.

While the focus of this hearing on MPAs is as a fishery management tool, concerns about the lack of a coherent national policy regarding existing state, Federal and locally administered MPAs should be noted. The situation is exacerbated by the lack of clarity and agreement on definition of MPAs and a lack of articulated goals and objectives. One example of a Federal regulatory action that could significantly impact the fishing industry is a proposal by

the Environmental Protection Agency that, among other things, would designate special ocean sites for purposes of limiting ocean discharges.

EPA, under this proposal—

Mr. GILCHREST. Special ocean sites for what? For eliminating—

Mr. GILMORE. It is a new initiative in which EPA could designate special ocean sites.

Mr. GILCHREST. For what purpose?

Mr. GILMORE. For limiting ocean discharges from vessels—seafood processing waste, for example.

Mr. GILCHREST. Oh, to limit the discharge of vessels in those areas?

Mr. GILMORE. Correct.

Mr. GILCHREST. I got you.

Mr. GILMORE. EPA or any petitioning party could seek to designate an area as a special ocean site, an SOS. The definition of a candidate site is so broad as to include any area designated under the Endangered Species Act as providing critical habitat for threatened or endangered species. In the North Pacific, over 10,000 square miles of ocean are already designated as critical habitat for endangered Steller sea lions.

The draft proposal by EPA further reads if these areas are already designated for protection under other authorities, EPA believes that SOS status may also be appropriate as an additional level of protection. Currently, there are more than 100 catcher-processors using trawl, longline or pot gear fishing in Bering Sea-Aleutian Islands Management Area under a general ocean discharge permit issued under the Clean Water Act. An SOS designation could affect fishing operations in that fleet of vessels by limiting the existing permit that we have.

EPA did not consult with the North Pacific Fishery Management Council or fishing communities in developing this proposal, although there were consultations with NOAA. This is just one example of a proposed Federal action under the MPA Executive Order that could greatly impact the fishing industry. We expect that there are others.

The fishing industry agrees with those calling for a comprehensive review, an inventory, if you will, of existing MPAs giving due consideration to fishery management measures that are already in effect. The purpose for creating and maintaining MPA status for protected areas should be reviewed, and the effectiveness of MPAs in achieving their original goals and objectives should be evaluated.

Within the context of that review, definitions and policy objectives must be clearly defined. There should be an adequate understanding of the regulatory burden on fishery managers and the fishing community in complying with broad, new EFA mandates.

In light of that, Federal agencies should suspend new initiatives until it is clearly understood what MPAs are, and the efficacy of the current program has been evaluated. To the extent that such initiatives continue to move forward and affect fishing activities, Federal agencies should work collaboratively with regional fishery management councils to coordinate actions and to promote stakeholder involvement from the fishing community.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Gilmore follows:]

Statement of Jim Gilmore, Director of Public Affairs, At-Sea Processors Association

Thank you, Mr. Chairman and members of the Subcommittee, for the invitation to testify today on the use of marine protected areas (MPAs) as a fishery management tool. I am Jim Gilmore, Director of Public Affairs for the At-sea Processors Association (APA). APA represents seven companies that operate 19 U.S.-flag catcher/processor vessels. The catcher/processor fleet participates in the Nation's largest fishery, the Bering Sea/Aleutian Islands groundfish fishery, and in the West coast Pacific whiting fishery.

Marine Protected Areas (MPAs) and the North Pacific Fisheries.

Participants in the North Pacific fisheries have followed closely, but anxiously, the emerging national debate on marine protected areas. The breadth and scope of Executive Order 13158, issued by President Clinton almost two years ago today, is still unclear and the impacts on fishing communities unknown. A March 2002 report issued by the National Oceanic and Atmospheric Administration (NOAA), "Marine Protected Areas Needs Assessment Final Report" finds that policy makers must still undertake the basic task of "identifying MPA goals and defining MPA terminology."

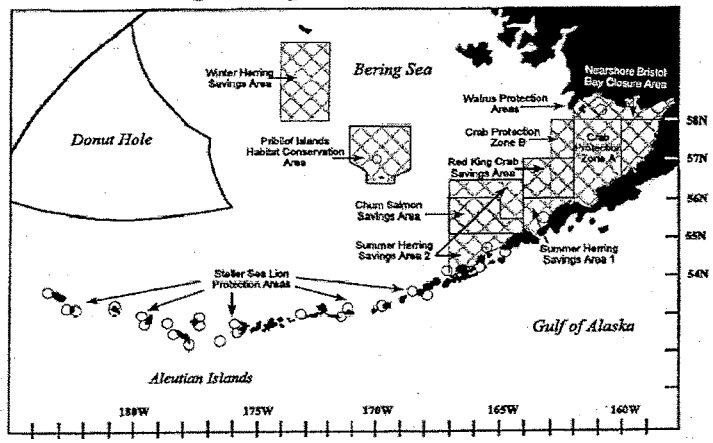
It is difficult for fishing organizations to develop a coherent position on MPAs absent a definition of what an MPA is. However, there appears to be general agreement that MPAs include marine areas that are closed permanently or seasonally to achieve fishery management objectives. Fishery management regulations for such areas might also restrict the use of some or all types of fishing gear. The purposes for such closures could include:

- Managing natural resources;
- Reducing fishing gear conflicts;
- Protecting endangered species;
- Protecting sensitive habitat;
- Providing research opportunities; and
- Conserving biodiversity.

The map below shows that in the Bering Sea/Aleutian Islands management area, Federal fishery managers have already created marine protected areas encompassing more than 30,000 square nautical miles of ocean. The MPA website maintained by NOAA identifies a number of these closures on the inventory of U.S. MPAs.

Some of the MPAs in effect in the Bering Sea/Aleutian Islands management zone close areas to all or some fishing to reduce, or eliminate, the effects of fishing on marine mammals, including threatened and endangered species. Other closures are designed to reserve access to fishing grounds to certain gear types or certain-sized fishing vessels. Fishery managers have also imposed MPAs to reduce the likelihood of incidentally harvesting non-target species that might be intercepted in such areas, and another type of MPA is designed to protect certain types of sensitive habitat. Virtually all of the protected areas identified below restrict trawling for some or all of the year. In other cases, trawl area closures are triggered if "prohibited species" bycatch caps are reached.

Bering Sea Species Protection Areas



According to a paper presented by North Pacific Fishery Management Council staff member Jane DiCosimo in November 1998, the three king crab closures in Bristol Bay alone comprise "approximately 25% of the continental shelf where commercial quantities of groundfish can be taken with bottom trawl gear," exceeding the "theoretical minimum of 20% of available habitat...of an effective marine reserve suggested by Lauck et al. (1998)."

There is an effective monitoring and enforcement program in place in the North Pacific fisheries to ensure compliance with MPA fishing restrictions. Among other management measures, there is comprehensive Federal fishery observer coverage onboard vessels as well as a requirement that vessels be equipped with Vessel Monitoring System (VMS) units that electronically record and report vessel locations on a real-time basis to NOAA Fisheries.

The existing MPAs in the Bering Sea/Aleutian Islands management area (along with the MPAs for the Gulf of Alaska management area that total another 45,000 square miles) were developed through the regional fishery management council process. When a resource management problem is identified, the North Pacific Council develops a suite of management alternatives that address the problem. The Council then conducts a thorough analysis of the alternatives for public review and comment and takes action based on the best scientific information available. The council process, authorized under the Magnuson–Stevens Fishery Conservation and Management Act, operates in accordance with requirements of the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA) and the Administrative Procedure Act (APA), among other laws.

Fishery managers must often balance competing priorities and objectives in utilizing MPAs as a fishery management tool. There are incidental catch considerations. Fishing effort that is shifted from fishing grounds newly designated as a marine protected area could result in increased non-target species catches elsewhere. For smaller vessels, there are safety issues associated with MPAs that close near shore areas and move fishing effort offshore. MPAs for fishery management purposes also need to be adaptive as climate change can affect migratory patterns and abundance on a species-by-species basis. In our view, the North Pacific Council has acted proactively and aggressively in addressing resource management and conservation needs. The Council has been precautionary in its approach and developed adaptive management measures that respond to ever changing environmental conditions in creating MPAs for fisheries management purposes covering 75,000 miles of the management area under its jurisdiction.

MPAs and Essential Fish Habitat (EFH).

The Essential Fish Habitat (EFH) provisions of the 1996 Sustainable Fisheries Act directed regional fishery management councils to describe and identify EFH in fishery management plans, identify adverse impacts on such habitat and take necessary measures to ensure conservation and enhancement of such habitat. The North Pacific Council is preparing an Environmental Impact Statement (EIS) as part of a comprehensive approach to fulfilling the mandate of the new EFH requirements.

In April 2002, the Council issued a report describing the fishing gear used in the fisheries under the Council's jurisdiction as well as a description of fishing operations. In addition, the report describes the habitat where each fishery occurs and describes existing rules to minimize the effects of fishing on the environment. A Council stakeholder committee is identifying candidate Habitat Areas of Particular Concern (HAPC) within EFH and will recommend to the Council such measures as may be necessary to minimize, to the extent practicable, adverse effects on essential fish habitat caused by fishing.

In some regions, the focus on EFH might be to restrict fishing in HAPC to allow fish populations to rebuild. This has not been the emphasis in the North Pacific where the fish stocks are already healthy and robust. For example, no Alaska groundfish stocks are overfished or approaching overfished status, according to NOAA Fisheries' most recent annual report to Congress. Environmental conditions have resulted in low abundance of some crab stocks, but harvests have been significantly scaled back, or fisheries closed, to allow stock rebuilding until more favorable environmental conditions return. Efforts by the North Pacific Council to implement EFH requirements are focused more on identifying HAPC and, if necessary, developing mitigation measures to protect sensitive habitat areas from adverse impacts of fishing. This is a difficult and time-consuming task, and the Council is allocating substantial resources to a multi-year project that could result in a significant expansion of MPAs in the North Pacific.

We urge Congress, Federal agencies and Federal advisory panels that are engaged in developing MPA definitions and articulating policy objectives and goals to recognize that existing law already provides regional councils ample authority to impose MPAs when circumstances warrant such action. Moreover, the North Pacific Council has exercised this authority numerous times, including dedicating substantial staff time and funding to meet its responsibilities under EFH. We recommend that any new MPA initiatives to achieve conservation and management objectives be promoted within the existing fishery management council structure. The North Pacific Council has an excellent track record for protecting natural resources, and the council process provides stakeholders with maximum opportunity to participate in the decision making process.

MPAs and Marine Reserves.

While ill defined at present, MPAs should not be confused with no-take marine reserves, which have been proposed by some as a way of increasing productivity and overall catch levels. The science regarding the efficacy of marine reserves to increase long-term fishery productivity is incomplete and inconclusive. In the case of pollock, for example, the principal species fished by APA catcher/processors, there is no evidence to suggest that marine reserves would be effective for enhancing catches. Pollock stocks are currently approaching historically high levels of abundance. NOAA Fisheries' scientists estimate that the spawning biomass of Bering Sea pollock is approximately 11 million metric tons, roughly 2.4 billion pounds of adult fish.

Pollock stock abundance is a function, in part, of how much phytoplankton and zooplankton is available as food, and the availability of plankton is determined by environmental conditions that are unrelated to fishing (e.g. water temperature, wind direction, ocean currents, etc.). A second key factor in pollock abundance is predation, including predation on juvenile pollock by cannibalistic, adult pollock.

Fishery managers have also adopted a precautionary approach to fisheries management by employing conservative harvest levels. In fact, in 2002 the total allowable catch level of Bering Sea pollock is only two-thirds of the catch limit that is biologically acceptable. In addition, the Council has developed an effective harvest monitoring and enforcement regime that includes requirements for comprehensive Federal fishery observer coverage on vessels, weighing of all catch on certified scales, electronic catch reporting and use of Vessel Monitoring System (VMS) technology.

Pollock is also a pelagic, not sedentary, species. Pollock spawn in the open ocean waters, are distributed over vast areas of the Bering Sea and are highly mobile. And pollock have a relatively short life span, reproducing by age 3 and living only until about age 10 or 12. Given that pollock abundance is dictated by environmental factors, that managers employ risk averse harvest strategies, that fish stocks migrate great distances throughout the Bering Sea, and that the species is relatively short-lived, marine reserves do not serve as a useful management tool for this fishery.

Non–Fishery Management MPAs—A Case Study.

While the focus of this hearing is on MPAs as a fishery management tool, concerns about the lack of a coherent national policy regarding existing state, Federal and locally administered MPAs should be noted. The situation is exacerbated by the

lack of clarity and agreement on definitions of MPAs and a lack of articulated goals and objectives. Uneasiness about the current state of affairs is heightened as disparate agencies respond to E.O. 13158 with far-reaching initiatives that are not coordinated, lack adequate stakeholder participation and ignore management measures that are already in place.

One example of a Federal regulatory action that could significantly impact the fishing industry is a proposal by the Environmental Protection Agency (EPA) that, among other things, would designate Special Ocean Sites (SOS). In January 2001 in the final days of the Clinton administration, EPA submitted to the Federal Register a final rule relating to ocean discharge criteria. The rule was not published before the Bush administration came into office, and the rule was pulled back for review. However, EPA has informed interested parties that it will continue to press for adoption of this measure consistent with the executive order on MPAs.

Under the proposal, EPA, or any petitioning party can seek to designate an area as a Special Ocean Site. The draft rule states that an SOS would be an area of "outstanding ecological, environmental, recreational, scientific or esthetic value" and could include any area "designated under the Endangered Species Act as providing critical habitat for threatened or endangered species." The draft further reads, "If these areas are already designated for protection under other authorities, EPA believes that SOS status may also be appropriate as an additional level of protection (emphasis added) if needed."

More than 100 trawl, longline and pot at-sea processing vessels fish in the Bering Sea/Aleutian Islands management area under a National Pollutant Discharge Elimination System (NPDES) general permit issued by EPA under Section 402 of the Clean Water Act. EPA's new proposal under E.O. 13158 "would prohibit any new permits for discharge at the site, as well as prohibit the significant expansion of existing discharges."

This proposal raises numerous concerns. One concern is the potentially broad designation of SOS areas. The rule indicates that a critical habitat designation could be the basis for an SOS designation. In the Bering Sea/Aleutian Islands and Gulf of Alaska management areas, critical habitat for endangered Steller sea lions encompasses tens of thousands of square miles of ocean waters. Fishing is permitted in some but not all sea lion critical habitat as scientists recognize that some portions of critical habitat (e.g. those closer to rookeries and haulouts) are more important to the animals than other areas farther from shore. An overlapping SOS designation with associated restrictions on vessel operations (i.e. ocean discharges) could severely impact the at-sea processing sector.

EPA did not consult with either the North Pacific Council or the fishing industry in developing this proposal, although I understand that NOAA Fisheries was consulted. This is just one example of a proposed Federal action under E.O. 13158 that could greatly impact the fishing industry. There are likely others.

The fishing industry agrees with those calling for a comprehensive review—an inventory—of existing MPAs. The purpose for creating and maintaining MPA status for protected areas should be reviewed and the effectiveness of MPAs in achieving the original goals and objectives should be evaluated. Within the context of that review, definitions and policy objectives must be clearly defined. Federal agencies should suspend new initiatives until it is clearly understood what MPAs are and should be and the efficacy of the current program has been evaluated. To the extent that such initiatives continue to move forward and affect fishing activities, Federal agencies should work collaboratively with regional fishery management councils to coordinate actions and to promote stakeholder involvement from the fishing community.

Summary and Recommendations.

- Any definition of MPAs should be broad enough to include fishery management actions that close an area permanently or seasonally and/or restrict the use of a certain type or types of fishing gear for purposes of achieving conservation and management objectives.
- We do not believe that a percentage-based goal, such as designating 20% of a management area as an MPA, is appropriate or useful, but if Congress or Federal agencies set such an arbitrary goal, calculations should not be based solely on no take designations but on the vast areas already designated as MPAs for fishery management purposes or to achieve other conservation goals.
- Regional fishery management councils and stakeholders are working diligently to implement far-reaching EFH requirements of the Sustainable Fisheries Act. Regional councils and NOAA Fisheries are identifying EFH and HAPC and evaluating the impacts of fishing on such areas. Where necessary, mitigation measures will be proposed, affecting fishermen. The fishing community is deep-

ly involved in this process and will find it difficult to commit resources to monitoring other Federal MPA initiatives that could substantially affect their livelihoods.

- Federal MPA activities affecting fisheries should be put on hold until MPAs are properly defined and goals and objectives are identified. However, if other MPA initiatives are forthcoming, those that affect fishing should be considered in close consultation with regional fishery management councils and the fishing community.
- Half of all fish and shellfish landings in the U.S. come from Federal and state waters off Alaska. The North Pacific fishing community should be adequately represented on NOAA's MPA Advisory Committee established under E.O. 13158.

That concludes my testimony, Mr. Chairman. I am pleased to answer any questions that Members of the Subcommittee might have. Thank you, again, for the opportunity to testify.

Mr. GILCHREST. Thank you, Mr. Gilmore.

Mr. Davis?

STATEMENT OF GERRY DAVIS, GUAM DEPARTMENT OF AGRICULTURE, ACTING CHIEF, DIVISION OF AQUATIC AND WILDLIFE RESOURCES

Mr. DAVIS. Chairman Gilchrest, Ranking Member Mr. Underwood, it is an honor and a privilege to be here with you today to talk about the MPA issue, and I thank you very much for this opportunity.

I am waiting here for a few minutes to try to get a PowerPoint projector up on the wall here, and hopefully, that will enable me to better describe what Guam has done on this issue, which I think is the best way for me to try to address the region's issues on MPAs.

I do not know whether you can see that from up there or not—

Mr. GILCHREST. We are getting ready to use our technical skill to reduce the amount of light in the room.

[Laughter.]

Mr. GILCHREST. We have got a good man doing it, though. Keep going, Kevin. We should have it like that all the time. That is perfect. I think that is perfect. Thanks.

Mr. UNDERWOOD. Very good.

Mr. DAVIS. Just to make sure we are all talking about the same part of the world that I am, we have to take a step about halfway around the globe from here to get around to the 13 degree mark above the equator where Guam is located. If you look in the upper part of your screen there, the Northern Marianas Islands, U.S., and Guam are located there. And I think it is real critical in reviewing the MPA issue to realize that you are going to have to look at MPAs on a site-by-site basis, just because they all have very different applications, and that word has very different meanings to different people in different places.

The MPAs that I am talking about for Guam are no-take areas, and we went through a pretty extensive process that I would kind of like to outline to you today just to try and emphasize why we think these areas are critical to the long-term future at least in the islands.

Guam is a tourist destination, and the bulk of our economy is driven by this. As you can see from this, we have only got a very small reef area of 69 kilometers. But it is valued at about $143 bil-

lion, and that is largely because of the protections it provides for that industry and also the many resources that it provides to the community there.

There is not much that you can do on an island that is not related to the reef. I mean, what you do on land today is in the ocean tomorrow. It is only 32 miles long and 10 miles wide at its widest place, so it is not a very big place. It is a large ocean.

The other thing is I cannot advocate enough how critical that is to our economy there. If you look at something simple as the industry of diving, Guam certifies more divers than any other place in the world except the U.S., and for a little tiny rock like that, that is a pretty significant income. Without a healthy reef, this industry goes away. So MPAs represent our economic future.

In addition to that, fishing and the use of those resources is heavily interwoven into the cultural and social fabric of the island, and it is something that often is overlooked in this process. I mean, if you think about the value of a father and his son out there fishing, it is often something you do not put a dollar value on. But if you trade that for somebody watching a TV, I think you are losing. And so, there are things like that that I think provide tremendous value to a culture and to a community that often get overlooked in this process that we need to get a better handle on evaluating.

Now to the hard part: many of us in the islands have seen this happen in places that have gone through urban development, and this diagram up there basically shows you that we are having a stock decline problem on Guam. Please note that it interfaces both the effort and the catch statistics, and this is something that my office has spent a great deal of money and time doing over the years, and it has also been the foundation for where the MPAs need came from.

Fifteen years ago, we were catching 70 percent more fish than we are now. The effort has only continued to increase there from a fishing standpoint, and the stocks continue to decline. It is not only a fishing issue.

One of the things my office also has done is spent a great deal of time trying to deal with this issue of size over fishing, and it is a concept that much of the public does not really take the time to understand. The two fish you see before you are things that are highly prized on Guam as consumptive food items. The upper left is a five-inch female Goatfish, and the lower is a 10-inch female Goatfish. Like it or not, guys, it is only the females that count in this industry, because that is where all of the eggs come from, and that is always the way it is going to be.

Most people in the public tend to think if you have got two of the top ones, you come out equal to having the one on the bottom. It does not work like that at all. The top one produces about 1,000 eggs once per year, and that is as much as you are going to get from that guy—or girl. The bottom one produces about 25,000 eggs and can spawn four to five times a year. And so, when you start looking at it graphically, this is the picture you are really looking at.

As a manager, I have always struggled with the idea of saying to the fisherman throw the big one back, because that is the one he wants to catch. But that is really the one you have got to save,

because if you have got to determine how many eggs you want to keep in the pocket, you have got to come up with a number of either dealing with all of the small ones or dealing with the one big one. And that is where the concept of the MPAs works very well.

I also mentioned that it is not just a fishing issue. All right, yes, the stocks are down, but like I told you, what you do on land today ends up in the ocean tomorrow. Guam has been fraught with problems with sedimentation, herbicides, pesticides, petroleum products that all end up in our coastal areas very quickly. The science behind the impacts of these has also only become known recently, just because the reproductive process of many of the fauna that exist on Guam were not well known until the last few years.

If you are not working on every piece of this puzzle and trying to fix the problem, you are going to fail. And that is one of the things that it is very important for fishermen to hear is that it is not just them that is causing the problem. This just kind of graphically illustrates some of the challenges that we have. The upper left is a storm drain that comes off one of our roads in the coastal area that is dumping a lot of sediment, petroleum products in the run-off and other herbicides and pesticides that is causing large-scale habitat loss.

The center picture is actually habitat loss due to Jet Ski use. As I told you, we get a million plus tourists there a year, and they want to do recreational things. They come there for clean water, warm climate and beautiful beaches, and they want to do things in the water. And so, naturally, we have a lot of things that attract them to using the areas. Well, those new uses have impacts. The idea that tourism is a clean industry is not something that we all accept, and anytime you bring a million people someplace, they create sewage. They need food. They are going to create human impacts on the reef. These are all things that need to be addressed in changing the way we manage those systems. Jet Skis have their place, but when you put them in shallow places, they cause large-scale loss to that habitat.

The area to the right was an area that was buried by sediment nearly 10 years ago. As you notice, there are no fish in that picture; there is nothing growing there. Recovery is slow. Prevention is always the best way to go.

The far left is a beach that is supposed to be a place where tourists want to go to, but you can see that there is a lot of storm debris there, and that is not a pretty sight. It is not someplace that someone is likely to come back to. It is something you have to address.

The middle picture is a disaster. This is a sewage outfall. Federal sewage laws in terms of where those outfalls occur do not work for Guam. Sixty feet of water on a coastal plate is miles offshore. In Guam, you can throw a rock to it. This is a classic example of where local law has got to have a different set of rules.

The far right is a classic example of what people target there as a fishery. When we went through a huge economic boom in the mideighties, the use of subsistence resources quickly changed to commercial use. It has been shown in many places around the world that commercial fisheries do not survive long on coral reefs. Those fish are pretty hard to find these days.

We went through a 14 and a half year process, seven hearings, thousands of testimonies, and I wish that I could step back in time and have started that process over again, because if there was nothing more important learned in that process, it has to be transparency and public inclusion, because I was the one that took the responsibility of overseeing those hearings, and I can tell you that the first set of hearings that we had was nothing short of a disaster. I became the biggest target on the island and was public enemy No. 1.

But it taught me that I was wrong, because it was my plan and not theirs. And so, we took a big step backwards; went through a huge educational process; and ended up with something that I think was generally publicly accepted. There were thousands of testimonies; it was 90 percent against in the beginning and 90 percent in favor in the end. I think the basic issues were public distrust in the beginning; public education—we had not done a very good job of providing the data that we had collected over the years. Public involvement was nonexistent, and it took 14 and a half years to get majority acceptance.

What are we talking about? Guam has set aside 28 percent of its coastal areas—that is more than anyplace else in the U.S., and it is the only place that presently lives up to the U.S. Coral Reef Action Plan of setting aside 20 percent of coastal coral reef areas by the year of 2010. When we proposed setting up these areas, there were actually nine areas on the table, five of them permanent, four of them rotating. Through the process, what basically happened was the fishermen accepted that the permanent areas were needed, and we did not need the rotating ones because we convinced them that we were in dire straits and needed to do something. The rotating areas were basically for their education, because it is the large fish we were missing.

I would support what some of my colleagues have said that you must make sure your objectives are clear and your goals are understood. In Guam's case, it was to restore the resource and get the big fish back into the populations.

These are two examples of places that are protected on Guam. The one in the top is a village setting, not much development, and the way this works is they basically get a recovered fishery. They get big fish back in the system; things that come out of the preserve, they can catch, and definitely, increases in recruitment.

The lower one is right in the heart of our tourism district, and this is something that is going to sell itself. We have an area there, and I will let you see for yourself, that has really been enforced for only about 2 years that was known for an area that did not have fish. And I think that has changed quite a bit. I will let you decide for yourself what you think. This was an area that a one-time swim with a video camera captured. It was not a set-up thing. You could go there any day and see this kind of thing. This was an area that pretty much did not have fish, and the target behind the MPAs was to get food fish back in the system, the big guys.

A lot of the fish you are seeing here are fish that are highly prized in a consumptive arena, and that is a big part of being able to give something back to them. The deliverables must be well-defined, and so, this is part of that process. We had data before, and

we have data after. And I think generally or at least right now, we are on target for delivering what it is we told them we were going to do.

For Guam and for most of the coral reef areas, I think there have been quite a few recent works that are showing this is a successful way to manage coral reef systems. The typical size restrictions or area restrictions do not work real well there just because like on Guam, we have 1,000 species of fish and over 300 that we harvest there for consumptive purposes. We would have to have a different size for each one. You would have to go get a Ph.D. to be able to do that. You would be counting cheek scales and fin rays to know what you are allowed to catch.

That is a disaster from an enforcement standpoint, let alone from a fisherman's standpoint. Education and enforcement are the keys. There was a tremendous amount of distrust at the public level of whether the Government of Guam could even enforce these areas. And a lot of that depends on the eyes and ears of the public to say this is something wrong. So if it is not a bottom-up approach, it is not going to work, because I depend on those people to call and say there is somebody doing something wrong.

There are lots of other places in the world that have long-standing traditions, hundreds of years if not thousands, of doing these types of things, and they were community-based. I think it is time that the U.S. adopt some of what other parts of the world have known for a long time: community-based, grassroots approaches to conservation are a very effective way to go with things. You must enlist the public early, and that was the lesson I learned if nothing else. Deliverables must be well-defined. Your goals must be clearly outlined, and if they do not work, then, you have got to retool what you are doing.

If an MPA does not work, then, close it and do something else.

Cultural and socioeconomics need more attention in this process. The valuation process for these things gets overlooked in every permit that I have ever been involved with, and I think that is a tremendous part of the culture and social aspects that are being lost. And if we do not do something to preserve the resource, you are going to lose that aspect.

That pretty much concludes my presentation. If you have questions, I would be more than happy to answer at this time.

[The prepared statement of Mr. Davis follows:]

Statement of Gerry W. Davis, Guam Division of Aquatic and Wildlife Resources

Good morning. I am Gerry Davis, Chief of the Guam Division of Aquatic and Wildlife Resources. It is a pleasure to speak before you today regarding marine protected areas and to report on Guam's activities to implement this concept as a management tool.

Guam is a U.S. Territory in the tropical Western Pacific. Guam is the largest and most Southern most island of the Marianas Archipelago. Guam is roughly 212 square miles in size and located 13 degrees north of the equator. Guam is a volcanic island surrounded by fringing coral reefs. These lush reef ecosystems have provided the social and cultural fabric through Guam's history. Over 300 species of hard coral, over 1000 species of fish and several thousand invertebrates are common to Guam's waters.

Guam continues to depend extensively on coral reefs to provide food, social and cultural values and more recently the main attractant for tourism. Guam sees more

than a million tourists annually looking for a warm climate and clear water and white sand beaches.

A little over 15 years ago Guam's fisheries resources began to show signs of collapse. Catches dropped while fishing activity continued to increase. A flourishing economy put additional pressure on the coastal resource that were historically only used for subsistence. Present catches are 70% less than just 15 years ago and this is a stock based decline. The decline is attributed to overfishing but also extensive habitat loss from poor land management practices causing sedimentation and the introduction of toxic chemical to the coastal waters.

The Government began looking for tools to aid and protect these valuable resources. The traditional tools used for managing fishery resources in the U.S. were reviewed but not practical for Guam. Using size limits with so many species and many types which are very similar in appearance would be difficult for the public and near impossible for enforcement. Regulating gear types would result in the usual special interest user group objection in trying to get laws in place. Seasonal closures for species posed many enforcement complication the were seen to be difficult to overcome. In the end a comprehensive package improving language of existing laws coupled with a proposal to establish 5 permanent marine protected areas and 4 rotating marine protected areas was proposed. Guam law requires a public hearing be held before regulations can be submitted to the legislature. Due the importance of the fishing on Guam, it was decided to hold three hearings spread out within the island. The first set of hearings were emotional, heated at times and stirred up the community. It forced the regulatory agency to step back and realize that if this effort was going to work, the public had to be given a chance to see and understand the information about the status of the resource and the options available to try if fix some of the problems.

There were a number of issues that are critical to having successful marine protected area on coral reefs in the islands that must be considered. Islanders think of coral reefs as sources of food and play a significant role in social and cultural issue. These issues must be imbedded in the mission of the preserves from beginning or they will not work. The goals must be clear, measurable and deliverable. The public must be engaged from the beginning. There must be well thought out criteria in selecting areas or enforcement and public understanding will be impossible. Guam also had a large advantage in have very good stock and harvest data that tracked the decline in the resource and also was able to demonstrate the size overfishing impact on the resource. This became a major goal, to restore the large animals in the populations because they were the major egg producers.

In May of 1997 Guam passed into law 5 no-take marine protected areas. It took years before enforcement protocols could be resolved. The preserve areas have been fully enforced now for two years and are show the expected increases in biomass both in numbers and size. In time, marine fauna egg production should be restored to the point that Guam's reefs are capable of recovering. This effort protects 28% of Guam's coral reefs and made Guam the only U.S. area to have reached the protection of 20% of our U.S. coral reef areas by the year 2010 established in the Coral Reef National Action Plan.

Guam's effort took 14.5 years, seven hearing, many meetings with fishermen, businesses before progress in getting a plan that the majority of the people could support. Thousands of testimonies were given and the proposal took on many changes based on public input. The nine (9) proposed areas was reduced to the five (5) permanent areas and a village ask that one area that had be proposed to be rotating be made permanent.

Given what Guam has experienced the following are critical to the Marine Preserve Area issue.

1. Research is showing that Marine Protected areas are appear to be working on Guam and have worked in other areas.
2. Marine Preserve Area establishment must be a bottom up approach and include the public early.
3. Having good baseline data goes a long way in helping the public understand and continued monitoring has to be part of any plan. If it not working than the management approach must be changed.
4. Cultural and Social aspect of preserves need to be give much more attention in future efforts.

That concludes my testimony. Thank you for the opportunity to testify. I will be pleased to respond to any questions that you might ask.

[A statement submitted for the record by Mr. Davis follows:]

Prepared by Gerry Davis, Guam Division of Aquatic and Wildlife Resources

Guam MPA Goals and Objectives

- To restore and sustain depleted coastal resources, focusing especially on food resources.
- To develop community understanding and partnerships in managing coastal resources.
- To maximize the benefits

Background

Guam is the most Southern island in the Marianas Archipelago. Guam is 212 square miles in area and located 13 degrees north of the equator in the Western Pacific. Guam hosts lush fringing coral reefs consisting over of a thousand species of fish, over 300 stony coral species and thousands of other invertebrate species.

In the mid–1980's, this small unincorporated U.S. Territory experienced a significant economic boom that placed tremendous additional pressure on the coral reef ecosystem. We began to see more than a million tourists annually. Guam experienced large scale development focused on tourism. Guam began to experience increased problems with sedimentation, herbicides, pesticides, storm water discharges and recreational user conflicts. Utilities failed to keep up with the growth, causing regular power outages and sewage treatment exceeding capacity. The demand for food to feed the growing tourism industry went haywire and traditional and subsistence fisheries quickly became commercial to meet this demand. Coastal fishery stocks were exhausted quickly and catch per unit of effort plummeted. Habitat loss, overfishing and size overfishing were destroying the health of the coastal environment.

In 1986, the Division of Aquatic and Wildlife Resources determined that fish stocks were beginning to show signs of decline. Over a 15 year period there had been a 70% decline in harvest and catch per unit of effort (CPUE) values. The decision was made that actions were needed to stop the declines of the coral reef fishery and begin restoration. An evaluation of practical approaches was made and it was determined that regulation of fisheries and attention to restoring water quality were two primary threats that needed priority treatment. After evaluating potential fishery management tools a study was conducted to identify suitable sites to establish marine preserves. The study looked at 60 sites and targeted setting aside 20% of Guam's shoreline and adjacent reef area with a final goal of protecting 10% the shoreline and adjacent reef protected. The results of this study were based on criteria that included habitat diversity, species richness, usership, enforceability, cultural practices and economic benefit. Nine areas were selected, 5 permanent sites and 4 rotating areas (2 open for two years and two closed for two years and then rotated) In 1987, a was put forward but was not well received within the Agency. The predominate conflict, was the inclusion of a ban on SCUBA spearfishing. It took four years to fine tune this document and the removal of the ban on SCUBA spearfishing before the proposal was administratively approved. The proposal was circulated among various Government agencies for general comment. There were considerable comments from the other agencies and this caused significant changes to the proposal. The agencies included in the review were: Guam Visitors Bureau, Guam Environmental Protection Agency, Guam Department of Public Works, Guam Bureau of Planning, Guam Department of Land Management and the Guam Port Authority. The proposal included several key changes. A huge definition section to eliminate uncertainty, greater regulation on commercial fishing, proposed marine fishing licenses, limitations on imports and exports of aquatic species, 5 proposed permanent marine preserves, 4 rotating marine preserves, greater regulation of invertebrates and a freshwater fishing license.

In December of 1993, three public hearings were held; one North (Dededo), one Central (Agana), one South (Merizo). The hearings were well attended at Merizo and Agana. Public notice was poor prior to the first hearing and the Dededo hearing was therefore poorly attended. There was a lot of hostility and opposition presented toward licensing, preserves, and the regulation of imports and exports. There were 1031 testimonies (written or oral) of which 971 were against and 60 in favor of the proposal. Out of the 971 nay sayers, 650 of these were the result of a fisherman opposed group call "Inekton Y Pescadores". These testimonies were reviewed and incorporated into a new draft. Each of the individuals who opposed the proposal was contacted and their issues were discussed to determine is there was a solution to their concerns. Several meetings were held with the leaders and membership of "Ineketon Y Pescadores". In many cases the fishermen did not believe the decline data and a number of them challenged the data. After considerable revision and community contact, the hearing process was restarted. The new package removed

licensing, removed regulation of imports and exports and reduced the number of preserves back to 5 permanent sites. This changes to the preserve areas proposed were largely due to an agreement with the fisherman group to drop the rotating areas because the accepted the decline data an the marine preserve concept. In July of 1995 a second round of three hearings was held. During this process one community asked that a temporary preserve that was removed be made into a permanent preserve (Achang Marine Preserve in Merizo). This effort was well received. The comments were reviewed, appropriate changes made to the proposal and the proposal submitted to the legislature. At the legislature, a number of changes were made: One preserve was removed (Anae Island), the freshwater fishing license was rewritten to apply only to "non-resident aliens", and the existing misdemeanor penalty law was rewritten to allow the Department to create their on penalty structure. In rewriting the penalty section the severability section was removed. Although flawed, this document became Public Law 24–21. The Governor signed Public Law 24–21 in May of 1997. A legal opinion was rendered that made parts of the proposal unconstitutional and others severely flawed. Again the Agency went through the triple A process and held a hearing proposed to correct these flaws. In January of 2000 the fishing regulation package became fully enforceable after 14 years.

There is attached addendum that provides more of the specifics on the fishery statistics that was used to justify the establishment of the marine preserves.

Lesson Learned

1. The community needs to be part of the plan in establishing Marine Preserves.
2. Be sure to have sound baseline data and well developed monitoring plans that preferable include the public.
3. Marine Preserves must be well defined, well enforced and goals and objectives clearly understood.

Recommendations

1. Marine protected areas work in place with stocks that have been depleted and species that are not highly migratory. Federal programs should encourage and fund the development of such systems within state jurisdictions.
2. There is still no clear law that protects coral reefs Federally. There are many laws which are used to attempt to do this but this is a piece meal approach to the issue.
3. Loss of established protected areas can be critical to the long term recovery of ecosystems. There needs to be a programs that provides funding to address short and long terms negative impacts to these declared critical resources.
4. Deliverable must be simple, closely monitored and reported to the public.
5. Cultural and Socio-economic components of marine preserve have been severely unaddressed in many cases and this needs attention.
6. The no-take issue needs to focus on biological sustainability and be sensitive to cultural and traditional uses.
7. The term MPAs needs to imply some type of significant resource protection and management at the sustainable level. A stricter definition would be acceptable but nothing less.

November of 1991

JUSTIFICATION FOR PROPOSED AMENDMENTS TO THE FISHING REGULATIONS

The following document addresses the sequence of events and justifications for the proposal to modify the Department of Agriculture's fishing regulations. The following information has been provided for reference:

BACKGROUND

The Department of Agriculture, Division of Aquatic and Wildlife (DAWR) is delegated the responsibility to control and regulate fish and game in and about Guam under Title 5, Guam Code Annotated (GCA) in Section 63102.

Guam has gone through a rapid economic growth over the last 10 years and this has had a significant impact on the health and use of Guam's marine resources. Historically our coastal marine resources were used primarily for subsistence fishing and has always been an important part of the social fabric. Westernization has steadily shifted the use of these resources toward recreational and commercial activities. These changes coupled with a growing tourism industry, diversified water recreation. This resulted in many new coastal users and many new coastal environmental impacts. The end result of these increased user was user conflicts between fishermen and swimmers, divers, boaters, jet skiers, windsurfers, etc. The economy also made it possible for more residents to afford boats, making access possible to

more remote, seldom utilized coastal areas. Fishing itself also changed through the introduction of modern rods and reels, more powerful spear guns, the use of SCUBA gear, the use of monofilament nets and underwater flashlights. Increases in population and diverse ethnic groups also changed the levels and types of pressures on these resources. Finally, poor land management practices degraded water quality all around Guam, negatively effecting the health of the coral reef habitat and interfering with reproduction processes. Wildland fires, poor erosion control plans for proposed developments, extended droughts, storm drainage, pollution and storm surge all have caused significant habitat loss in recent years and pose greater risks for the future. All of these factors have increased the pressure on the fragile marine resources surrounding Guam and justify the need to take some proactive measure to protect and restore the coastal natural resources.

DAWR has been monitoring the fisheries resources around Guam for over 20 years and has recently determined that the near shore fish resources are presently showing trends of rapid decline. Table 1 shows total harvest by method per year for the nearshore fishery during the years from 1986–91: Table 2 shows the top ten families of fish harvested over the same period and Table 3 the total harvest (lbs.) by fishing method over the same period. This time period from 1986 to 1991 was selected because the data gathering methodology was changed in 1986 to include night surveys. For this reason a shorter data set had to be utilized. The information presented represents shoreline fishing and excludes fishing from a boat, but method trends in the reef boat based fisheries are similar. This information is also based on an expansion of samples and therefore is limited in its application to looking at trends.

Total Harvest by method

The total harvest by method values present in Table 1, show declines across the 6 year time period in all categories. Logic would tell you that this is likely to be a stock decline because you would not expect all fishermen in all group to suddenly be less able to catch fish. This is an important first step defining a potential resource depletion and potential stock management need.

Top Ten Families Caught.

The top ten families of fish caught as presented in Table 2, merely identifies those families that account for the top ten ranking fish families by pounds harvested. Of the families identified, the surgeonfish family always accounts each year for the number one group in total pounds harvested. This is true primarily because it represents a large number of types of fish, many of which are important food fish (unicornfish, surgeonfish, tangs, etc.). The other families on this list which always make the top ten and are the goatfish, rabbitfish, jacks and emperors. Lastly, there are a couple groups which would either always appear higher on the list or which are not presently on the list but would have been there before. These groups are the parrotfish and wrasses. Notice that in each case there has been a significant decline in harvest. The top ten families of fish harvested annually from Guam's waters make up 70% or more of the total harvest and often exceeds 80%. True, there are some categories that do not show as marked a decline as these but the trend of decline is consistent throughout. Remembering that these are the key groups, the data presented shows a 60 to over a 80% reduction in some of the top ten families and these are the most highly prized and traditionally caught fish types. Decline in harvest of key species and shifts in species composition are a second piece of a puzzle that indicates a warning requiring more information.

Total Harvest (lb.) by Method by Fiscal Year

Table 3 three shows steady significant declines in CPUE. This is the critical and final piece to the puzzle showing stock decline and potential collapse for some species. In addition to harvest, it is important that fishing effort be analyzed because if less fish is being caught it could merely mean that less people are fishing or less time is being spent fishing. If less people fish then there should be more fish to catch by less people. This would mean that the catch rate would be high, but in fact the catch rate is also declining. These facts all together indicate that the marine fishery resources have been hurt, but this does not determine how.

Provided is a copy of a Division of Aquatic and Wildlife Resources (DAWR) Annual Report about the yellowstripe goatfish (Tiao' or Somonette). This report gathers the information that would be needed to manage this fish if necessary. In the process of gathering data it became obvious that Guam's population of yellowstriped goatfish are in trouble. A general problem in managing reef fisheries is not understanding how these resources sustain themselves. Many marine creatures, fish, corals, starfish, etc, release their eggs and sperm into the water to be fertilized. Once fertilized, the gametes go to the open sea at the mercy of the currents. After an ex-

tended period of time, for fish 30 to 60 days, provided currents, temperatures, and food were all acceptable, the young swimming larvae will return to Guam. Because of this phenomenon many forms of marine life rely on producing large numbers of gametes in hopes that sufficient numbers will survive to return. With respect to the production of gametes, this process is most dependant on the female population of the species. A few males can produce enough sperm to fertilize many females. Females on the other hand are limited by the number of eggs they can produce. The yellowstripe goatfish provides a good example of the importance of a healthy female population. A six inch female yellowstripe goatfish is just old enough to be mature and can produce about half a million eggs at one time. Because it is young and exerting a lot of energy into growth it probably will not produce eggs more than once a year. On the other hand a 12 inch yellowstripe goatfish would be considered a large old adult. Many people would look at the size and expect that this fish would produce twice as much as the six inch fish. Much to the surprise of many the large fish would produce 45.5 million eggs nearly 90 times more eggs. In addition, this fish could spawn several times during a year producing hundreds of times more eggs. If you review the report provided on the yellowstripe goatfish it paints and ugly picture. This fish has lost 95% of it ability to produce eggs for Guam. This is because there are very few big fish in the fishery. More than 60% of the reproductive potential and up to as much as 85% is vested in the larger fish. This explains why the tiao' (recruiting yellowstripe goatfish) runs are no longer like they were. This is one example of many and they all point to finding a way to preserve resources without losing the culture, food source and recreation.

Before any misunderstandings develops, it is important to remember that no one group or event is being blamed for the decline of fish around Guam. Also, if efforts are taken now there is no reason why these resources can not be restored to be what they once where. Management is a word which often is thought of as a bad thing because immediately it is associated with taking something away from the public. The true meaning of this word is "wise use of resources". The data gathered indicates some significant declines in fish resources. During the hearings, some fishermen questioned this information and there are two important considerations which should be presented: Most of the fishermen that expressed this concern based there doubt on their continued ability to catch fish. We certainly agree that it is still possible to have a good catch. The information presented does not contradict this either, but what is does show is that you can not consistently catch as much or as big a fish on average in the same amount of time as fishermen did just 8 years ago. The differences are not small, they are significant. Second, common sense would tell you that it is a lot less work and headache to do nothing than to go through several public hearing and get badgered for changing the regulations. We would much prefer to have a healthy resource which does not need any regulatory restrictions to protect it. If you observe the systems which have been developed in many other Pacific Island Countries, their regulations are more restrictive. We are behind the times in protecting our marine resources and the proposed changes should go a long way in protecting the future of our marine resources.

The proposal presented attempts to restore what was lost and maintain uses of resources. Nobody has been excluded from fishing in a traditional way or from catching their favorite fish and this was intentional.

This proposal alone will recover the fishery resources. The government and the public must be diligent about restoring water quality and dealing with pollution or the coral reef habitat will continue to degrade and there will be not place for fish resources to recover. In addition, there are statutory laws that need clarification, revision and creation to address the many changes in coastal use which have occurred recently

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Mr. GILCHREST. Thank you very much, Mr. Davis. I know you traveled halfway around the world to give us that presentation, and we appreciate it.

Dr. Warner?

STATEMENT OF ROBERT WARNER, PROFESSOR, DEPARTMENT OF ECOLOGY, EVOLUTION AND MARINE BIOLOGY, UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Dr. WARNER. Thank you for the opportunity to speak today, and thank you also, Gerry, for traveling 20 hours—that is what he said it took him to get here.

I am in the Department of Ecology, Evolution and Marine Biology at UC-Santa Barbara, also home of the National Center for Ecological Analysis and Synthesis. I have been a member of three working groups over the past 3 years at the National Center, NCEAS, as it is called. One of these groups concentrated particularly on the science of marine reserves, and I would like to describe some of the findings from that group today.

I would like to place my own written testimony into the record and also to place into the record a paper about to appear in one of the premier peer-reviewed journals published by the Ecological Society of America; it contains a summary of the working group's findings.

Mr. GILCHREST. Without objection.

[The report referred to follows:]

IN PRESS: ECOLOGICAL APPLICATIONS, A PEER-REVIEWED JOURNAL OF THE ECOLOGICAL SOCIETY OF AMERICA

PLUGGING A HOLE IN THE OCEAN: THE EMERGING SCIENCE OF MARINE RESERVES

JANE LUBCHENCO,[1] STEPHEN R. PALUMBI,[2] STEVEN D. GAINES[3] AND SANDY ANDELMAN[4]

Rapid and radical degradation of the world's oceans is triggering increasing calls for more effective approaches to protect, maintain, and restore marine ecosystems (Allison et al. 1998; National Research Council 1999a, 2000a; Murray et al. 1999, National Center for Ecological Analysis and Synthesis 2001). A broad spectrum of land and ocean-based activities, coupled with continued growth of the human population and migration to coastal areas, is driving unanticipated, unprecedented and complex changes in the chemistry (National Research Council 2000b; Boesch et al. 2001), physical structure (Lubchenco et al. 1995; Watling and Norse 1998) and biology (ibid, Vitousek et al. 1997; Botsford et al. 1997; National Research Council 1999b; National Marine Fisheries Service 1999;FAO 2000; Carlton, 2001; Jackson et al. 2001) of oceans worldwide. Symptoms of complex and fundamental alterations to marine ecosystems abound, including increases in: coral bleaching, zones of hypoxic or anoxic water, abrupt changes in species composition, habitat degradation, invasive species, harmful algal blooms, marine epidemics, mass mortalities, and fisheries collapses (Botsford et al. 1997; Vitousek et al. 1997; National Research Council 1999b, 2000a; Harvell et al. 1999). Fishing practices, coastal development, land-based chemical and nutrient pollution, energy practices, aquaculture, land use and land transformation, water use and shipping practices combine to alter the structure and functioning of marine ecosystems globally (Lubchenco et al. 1995). Fundamental alterations to ecosystem structure include changes in species diversity; population abundance, size structure, sex ratios and behavior; habitat structure; trophic dynamics; biogeochemistry; biological interactions and more. These changes in turn affect the functioning of marine ecosystems and the consequent provision of goods and services (Lubchenco et al. 1995; Peterson and Lubchenco 1997).

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As both the value and vulnerability of marine ecosystems become more broadly recognized, there is an urgent search for effective mechanisms to prevent or reverse widespread declines and to protect, maintain and restore ocean ecosystems.

Fully protected marine reserves are an emerging tool for marine conservation and management. Defined as "areas of the ocean completely protected from all extractive activities," fully protected marine reserves (hereafter, simply "marine reserves") have explicit prohibitions against fishing and the removal or disturbance of any living or non-living marine resource, except as necessary for monitoring or research to evaluate reserve effectiveness. Sometimes called "ecological reserves" or "no-take areas," marine reserves are a special class of "marine protected areas," (MPAs). MPAs are defined as "areas of the ocean designated to enhance conservation of marine resources." The actual level of protection within MPAs varies considerably; most allow some extractive activities such as fishing, while prohibiting others such as drilling for oil or gas. A third definition will complete the set and allow use of the appropriate terms throughout this special issue. A "network of marine reserves" is "a set of marine reserves within a biogeographic region, connected by larval dispersal and juvenile or adult migration." (National Research Council 2000a; IUCN 1994; National Center for Ecological Analysis and Synthesis 2001).

By protecting geographical areas, including both resident species and their biophysical environments, marine reserves offer an ecosystem-based approach to conservation or fisheries management, which is distinct from the traditional focus on single species conservation or management (National Research Council 1999a; National Marine Fisheries 1999). Marine reserves may provide multiple benefits including: protection of habitat; conservation of biodiversity; protection or enhancement of ecosystem services; recovery of depleted stocks of exploited species; export of individuals to fished areas; insurance against environmental or management uncertainty; and sites for scientific investigation, baseline information, education, recreation, and inspiration (Allison et al. 1998; National Research Council 2000a). Research is demonstrating that marine reserves are powerful management and conservation tools, but they are not a panacea; they cannot alleviate all problems, such as pollution, climate change or overfishing, that originate outside reserve boundaries. Marine reserves are thus emerging as a powerful tool, but one that should be complemented by other approaches.

Despite keen interest on the part of some, but serious skepticism by others with respect to the potential of marine reserves to protect biodiversity, protect habitats, and restore depleted fisheries, concrete information about marine reserves has been fragmentary until recently. In 1997, few syntheses of results from the various marine reserves around the world existed, modeling studies of marine reserves left critical questions unanswered, similarities and differences between terrestrial parks and marine reserves were fuzzy, and possible conflicts between different goals for marine reserves (e.g., between conservation and fishery enhancement) were unresolved. A symposium on marine reserves at the 1997 Annual Meetings of the American Association for the Advancement of Science, (see Allison et al. 1998) concluded that marine reserves appeared to hold substantial promise, but that progress in evaluating this potential would require a serious effort at analysis, modeling and synthesis.

As a direct result of that symposium, a Working Group on Marine Reserves was convened in 1999 at the National Center for Ecological Analysis and Synthesis. The goal of this effort was to advance the theory of marine reserve design, synthesize data on the performance of existing reserves, and develop tools to apply the new theory to practical situations. This Special Issue is one product. The 16 papers herein, plus a suite of other contributions, have substantially increased our understanding of the role of marine reserves in protecting and restoring marine ecosystems, and allowed us to define the next stages of implementation of this critical management option. In addition to the papers in this volume, see Barber et al. 2000; Botsford et al. 2001b; Hastings and Botsford 1999; Palumbi 2000; Palumbi and Hedgecock 2001 for other papers from the NCEAS Marine Reserves Working Group.

The papers presented here address three key aspects of marine reserve science. The first set of papers (Allison et al. this issue, Botsford et al. this issue, Gaines et al., this issue, Gerber et al., this issue, Hastings and Botsford, this issue and Largier, this issue) examines the theoretical underpinning of reserves, especially the relationship between reserve design and fisheries/conservation functions. An important advance is the development of models of networks of reserves that explore how multiple reserves arrayed along a coastline may interact to augment the contributions of individual reserves. Both reviews of existing theory and new models show how dispersal, reserve configuration, catastrophes, climate variability, and fisheries effort interact to influence the value of reserves. A common goal of these theoretical efforts is the search for inherent compromises between reserves designed to meet

fisheries versus conservation goals. Surprisingly few compromises have emerged as many of the design principles that promote population persistence converge on the principles that promote sustainability in fisheries.

A second set of papers (Carr et al., this issue, Grantham et al., this issue, Halpern, this issue, Neigel, this issue, Palumbi, this issue, and Shanks et al., this issue) reviews existing data on several key ecological and life history features of marine species and communities. Data on species-area relationships, dispersal distances, genetic structure and larval developmental periods represent timely contributions that are used to parameterize marine reserve models and to contrast patterns with terrestrial species.

Finally, the third set of papers (Airame et al., this issue, Leslie et al., this issue, Roberts et al., this issue, and Roberts et al., this issue) examines the practical application of reserve design criteria in real world settings. These contributions focus on lessons learned from existing reserves as well as on criteria for the design and implementation of marine reserve networks that are "comprehensive, representative and adequate," the three goals identified for terrestrial conservation efforts (Margules & Pressey 2000). Some important examples of the implementation of reserves around the world are included and provide insights into the benefits and challenges of integrating ecological theory into marine reserve policy. The use of mathematical siting algorithms (Possingham et al. 2000; Airame et al., this issue; Leslie et al., this issue), coupled with geographic information systems, provides an explicit and transparent mechanism for identifying spatially explicit maps of alternative reserve network scenarios that efficiently represent the full range of biodiversity that is characteristic to a region. Such methods provide a level of design flexibility that cannot be obtained through exclusively expert-opinion driven approaches.

Marine reserve research has benefitted from a large number of excellent reviews and collections of papers (for example, Agardy 1994, 2000; Dayton et al. 1995; McManus 1997; Roberts et al. 1995; Roberts and Polunin 1991; Ballantine 1999). The papers published in this special issue represent an incremental contribution that brings together new theory and syntheses of empirical data to advance understanding of the role of marine reserves in protecting and restoring marine ecosystems. More importantly, they demonstrate unequivocally that marine reserves are a viable and useful management tool in a wide variety of different settings.

Based on the reviews just cited and on the findings reported in this issue, a Scientific Consensus Statement on Marine Reserves and Marine Protected Areas was written and released at a Symposium entitled "The Science of Marine Reserves" at the 2001 American Association for the Advancement of Science. The full statement, its context, statement and list of 161 signatories are available from the National Center for Ecological Analysis and Synthesis in Santa Barbara, CA, USA (http://www.nceas.ucsb.edu/Consensus). The core of the statement was a new consensus by marine scientists about marine reserves that was endorsed by all of the authors of papers in this special issue as well as a large number of other scientists with expertise in marine reserves. The scientific consensus statement synthesizes the findings reported in this issue in language that is useful to scientists and non-scientists alike:

THE SCIENTIFIC CONSENSUS

The first formal marine reserves were established more than two decades ago. Recent analyses of the changes occurring within these marine reserves allow us to make the following conclusions:

Ecological effects within reserve boundaries:

1) Reserves result in long-lasting and often rapid increases in the abundance, diversity and productivity of marine organisms.
2) These changes are due to decreased mortality, decreased habitat destruction and to indirect ecosystem effects.
3) Reserves reduce the probability of extinction for marine species resident within them.
4) Increased reserve size results in increased benefits, but even small reserves have positive effects.
5) Full protection (which usually requires adequate enforcement and public involvement) is critical to achieve this full range of benefits. Marine protected areas do not provide the same benefits as marine reserves.

Ecological effects outside reserve boundaries:

1) In the few studies that have examined spillover effects, the size and abundance of exploited species increase in areas adjacent to reserves.
2) There is increasing evidence that reserves replenish populations regionally via larval export.

Ecological effects of reserve networks:

1) There is increasing evidence that a network of reserves buffers against the vagaries of environmental variability and provides significantly greater protection for marine communities than a single reserve.
2) An effective network needs to span large geographic distances and encompass a substantial area to protect against catastrophes and provide a stable platform for the long-term persistence of marine communities.

ANALYSES OF THE BEST AVAILABLE EVIDENCE LEADS US TO CONCLUDE THAT:

- Reserves conserve both fisheries and biodiversity.
- Reserves must encompass the diversity of marine habitats in order to meet goals for fisheries and biodiversity conservation.
- Reserves are the best way to protect resident species and provide heritage protection to important habitats.
- Reserves must be established and operated in the context of other management tools.
- Reserves need a dedicated program to monitor and evaluate their impacts both within and outside their boundaries.
- Reserves provide a critical benchmark for the evaluation of threats to ocean communities.
- Networks of reserves will be necessary for long-term fishery and conservation benefits.
- Existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool." (National Center for Ecological Analysis and Synthesis, 2001)

This statement and the papers in this issue on which it is based demonstrate the emergence of a science of marine reserves, a dynamic discipline that has made major strides in the past 5 years. This increase in knowledge allows us to see where the next phases of critical research lie. Two are worth highlighting—one biological, the other socioeconomic. Even though marine reserves are inherently a multispecies, ecosystem-based approach to management, the theoretical basis for their design remains largely focused on single species. Considerations of multi-species responses continue to rest on simple extrapolations from single species predictions. Although empirical studies have shown important consequences of ecological interactions following the establishment of reserves, our understanding of how such interactions affect the design principles of reserves is still rudimentary. Perhaps an even greater need lies in the interface between ecological and socio-economic disciplines. Our workshops only began to address the crucial interaction between the broad range of human stakeholders and reserve success (see Roberts et al., this issue), or the best methodologies for engaging different interest groups in the process of marine reserve research and design. The various socioeconomic disciplines have much to offer to the topic of marine reserves.

The design and implementation of comprehensive, representative and adequate reserve networks is the next great challenge for marine policy and resource management. Current information suggests that several features of marine ecosystems will dominate design principles. Although the topology of a network of marine protected areas can be complex, and there can be many differences between potential network designs, all networks have four key features that play fundamental roles in their functioning. These include (1) the span of the network (the length of coastline or area of habitat between the most distant protected units), (2) the size and shape of individual reserve units, (3) their number, and (4) their placement. Together these features determine other critical network features like the amount of area dedicated to protection and connectivity among reserve units. There are of course important network features that are unique to particular settings, but the above features seem to be common to most if not all networks, and provide useful focus to crystallize generalizations.

The answer to the question, "how much is enough" is the holy grail of conservation in both marine and terrestrial ecosystems. The goal of marine reserves is to ensure the persistence of the full range of marine biodiversity—from gene pools to populations, to species and whole ecosystems—and the full functioning of the ecosystem in providing goods and services for present and future generations. Because there will always be opportunity costs to conservation, there is a limit to how much we can conserve. Hence the crucial need to identify and debate criteria for adequacy. In the context of designing and managing marine reserve networks, decisions about adequacy are particularly challenging, given the complex life histories of many marine organisms, and our limited ecological knowledge of marine ecosystems. Although we cannot yet offer definitive answers to the question of adequacy, some important new insights have emerged from the body of work in this volume.

A century ago, T. H. Huxley stated that the oceans were an inexhaustible source of food and industrial products for humans to use with confidence. Our challenge today is to help ensure that this statement becomes true by building a heritage of reserve networks that will safeguard marine communities, and will complement more traditional fisheries management tools, making it more likely that future generations will inherit the beauty and productivity of the oceans.

Acknowledgments

We thank Jim Reichman and Marilyn Snowball at the National Center for Ecological Analysis and Synthesis for enabling our Working Group on Marine Reserves to be productive; the Communication Partnership for Science and the Sea (COMPASS) for creating the climate for the generation of the Scientific Consensus Statement; Megan Dethier for co-drafting the initial Scientific Consensus Statement and Lou Pitelka for his patience. Financial support for this issue was provided by the David and Lucile Packard Foundation through a grant to COMPASS, and a grant to the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO). This paper is PISCO publication number 74. The NCEAS Working Group and Sandy Andelman were supported by the National Science Foundation, the University of California at Santa Barbara and the State of California.

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Dr. WARNER. Thank you.

Mr. Chairman, Mr. Underwood, it has been estimated that marine ecosystem services have a value of $20 trillion a year, with most of that being provided from coastal ecosystems. But these ecosystems have altered dramatically over the past decades. In some places, they have essentially collapsed. Many of the fisheries of the world are depleted, and the species that we catch are getting smaller and further down the food chain, as Gerry was referring to.

The problems of habitat alteration, overfishing, pollution, exotic species and climate change all converge on the species that make up ecosystems. And the effects on one species can severely affect others. Evaluating and responding to these threats in an integrated fashion is the challenge we currently face. Let me make this clear: there is a real need to shift our attention to ecosystems-based management of the marine environment, away from the confusing and often conflicting mass of single-species management plans.

Marine reserves, which are areas of the ocean completely protected from all extractive activities, can be a useful tool for ecosystem-based management. They cannot solve all the problems of the coastal ocean, but they can stop habitat alteration and allow the recovery of depleted populations of many species at a time. Scientific evidence suggests that reserves can rebuild coastal ecosystems and recharge coastal fisheries. This is one of the few instances where we can combine benefit to both the extractive users and to the conservation community.

Well, do they work? We saw on a PowerPoint that one of them did, at least. Our NCEAS group attempted to locate as many peer-reviewed reports of biological responses to reserve protection in the U.S. and around the world. The results were striking. Regardless of whether the reserve was in the tropics or in temperate waters, there was strong evidence that reserves increase the abundance and size of many species within their borders. The biomass or ca-

pacity for reproduction in these species showed the most dramatic increase, at least doubling on average, regardless of the location of the reserves.

Now, not surprisingly, exploited species show the strongest positive response to protection, including species thought to be too mobile to benefit from reserve protection. But I want to stress that the changes seen inside reserves are ecosystem-level changes, not just the recovery of exploited species. Not all species increase inside reserves, but the overwhelming result from over 20 years of studies is that reserves generate broad changes within their boundaries in virtually all settings.

This is good news for ecosystem-based management. Reserves cannot stop pollution, prevent catastrophes or slow the arrival of exotic invaders into marine ecosystems, but they can help to withstand these threats, simply because they contain larger populations and more species.

Now, while the major role envisioned for reserves is the protection of habitats and ecosystems, there is added benefit if they export some of their population to surrounding areas, especially if reserves are viewed as a fishery management tool. Now, several studies, as Dr. Houde referred to, have shown that numbers and sizes of species are greater in areas near reserve boundaries and that catches near reserves are higher than in other areas. This can benefit particularly small-scale fisheries; the smaller fishermen, the recreational fisheries.

Substantial larval export of scallops in particular has apparently occurred in the Georges' Bank in the one example of a marine reserve large enough to have the potential to recharge commercial fisheries. Areas predicted to receive heavy larval export from reserves are in fact now yielding higher catches than in other areas.

How large should the reserves be? You will notice that we have all danced around this question. In general, as far as biodiversity is concerned, the larger the reserve, the better it is for biodiversity conservation. But that leaves very little area left in which to fish. Most fishery models of reserves suggest that the greatest impacts on yields occur when between 20 and 50 percent of the area is set aside. As Dr. Shipp referred to, the more depleted the fishery is on the outside, the more substantial the benefit from reserves.

So where does this leave conservation interests? To what extent can set-asides at this level work to rebuild ecosystems? The most recent scientific findings have suggested a solution: networks of smaller reserves. Networks can seed each other. They can provide spillover into fished areas, because they have extensive borders, and they can boost regional production of young as long as the aggregate area in reserves is sufficiently large.

Overall, the solution to managing multiple threats to the ocean requires an integrated approach that includes the need to preserve intact marine ecosystems on a regional basis. Marine reserves are one of the best tools we have to address management of entire marine ecosystems. While they are not the solution to every problem facing the coastal ocean, they can stem habitat destruction; they can alleviate the effects of local overfishing; they can simplify the simultaneous management of multiple species, and they can restore biodiversity within their borders.

While reserves are ideal tools for habitat protection and ecosystem preservation, they are best used as a complement to traditional fisheries management, as you have heard many times before.

The conclusion of the summary paper that I have included in the record contains the consensus statement on marine reserves, a remarkable document signed by over 160 Ph.D.-level academic scientists from around the world. The article is remarkable first because I have never seen 160 marine scientists agree on anything before, but second for the force of its recommendations.

I will conclude with the last line of the statement: existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool.

Thank you again for inviting me here, and I am more than willing to answer questions.

[The prepared statement of Dr. Warner follows:]

Statement of Robert R. Warner, Professor of Marine Ecology, University of California, Santa Barbara

Good morning, and thank you Mr. Chairman and the members of the committee for inviting me to testify today. My name is Robert Warner, and I am a Professor of Marine Ecology at the University of California, Santa Barbara, and have served as Chair of the Department of Ecology, Evolution, and Marine Biology. I served on the Science Advisory Panel to the Marine Reserves Working Group for the Channel Islands National Marine Sanctuary, and currently serve on the Sanctuary Advisory Council as the Research Chair. Over the past three years I have been a member of three working groups at the National Center for Ecological Analysis and Synthesis, all of which were concerned with coastal marine ecosystems. One of these working groups concentrated on the science of marine reserves, and today I'd like to outline some of our findings regarding the use of marine reserves as a tool for ecosystem-based management. In addition, I'd like to place into the record a paper just about to appear in one of the premier peer-reviewed journals of our field, sponsored by the Ecological Society of America. The paper contains a summary of the working group's findings.

Mr. Chairman, we depend on ocean life in many ways, far beyond the 80 million metric tons of food that we draw from the sea each year. The ecologist Stuart Pimm recently estimated that marine ecosystem services have a value of $20 trillion, with most of that being provided from coastal ecosystems. Yet these ecosystems have been altered dramatically over the past decades—in some places, they have essentially collapsed. Many of the fisheries of the world are depleted, and the species we catch are getting smaller and further down the food chain. The problems of habitat alteration, pollution, aquaculture, exotic species, and climate change all converge on the species that make up ecosystems, and effects on one species can severely affect others. For example, in Hawaii, nutrient pollution fuels algal growth, and fishing removes the fishes that eat the algae, and corals die underneath the encroaching seaweeds. In every marine ecosystem that one of the NCEAS working groups investigated, there was clear evidence of fundamental change and loss of resources, and these losses are accelerating. Ecosystem health is often measured in terms of productivity and species diversity, and it is precisely these measures that are declining in many coastal habitats.

Entire marine ecosystems are affected by threats at many levels, and evaluating and responding to these threats in an integrated fashion is the challenge we currently face. Let me make this clear: there is a real need to shift our attention to ecosystems-based management of the marine environment, away from the confusing and often conflicting mass of single-species management plans. On the West coast, there are 88 species that generate more than $1 million a year in fisheries revenue. In New England, there are 41 such species, and in both areas invertebrates like urchins, squid, and lobsters are the most valuable resources. Multiple overlapping single-species management plans can become cumbersome and difficult. A complementary approach to this problem is a scheme of ecosystem-based management.

Marine reserves, areas of the ocean completely protected from all extractive activities, can be a useful tool for ecosystem-based management. They cannot solve all of the problems of the coastal ocean, but they can stop habitat alteration and allow the recovery of depleted populations of several species at a time. Reserves are a

place- and habitat-based approach to management, distinctly different from single-species management.

Because much of the sea is hidden from our view, and because the ocean is so vast, we have not been as aware of changes in marine ecosystems as we are of terrestrial changes. On land, many of the larger animals went extinct soon after humans arrived on the scene, and commercial hunting disappeared at the turn of the last century. In the sea, many of the large animals are rare but still present, and harvesting of wild animals continues at high levels. There is hope in this fact—it may be possible to restore marine ecosystems in some places to conditions approaching their former glory, because most of the key players are still present. This is a chance to do more than build a small monument to what existed before. We have a much more rewarding goal: rebuilding coastal ecosystems and recharging coastal fisheries. This is one of the few instances where we can combine benefit to both the extractive users and to the conservation community. It can be done.

The simplest question to ask is what happens when reserves are established. That is, can we document the effect of reserves on coastal ecosystems?

Documented responses of animals and plants to protection inside reserves

The overall coastal area currently under full protection in marine reserves is less than a fraction of one per cent. Although reserves are rare in the US, several have been the subject of careful study. The NCEAS working group summarized these studies and scores of other peer-reviewed reports of the responses of animals and plants to reserve protection around the world. The results were striking. Regardless of whether the reserve was in the tropics or in temperate waters, there was strong evidence that reserves function to increase the abundance and size of many species within their borders. On average, population sizes of animals nearly double, and the animals themselves average about 30% larger. This means that the biomass (or capacity for production) of these species showed a dramatic increase, at least doubling regardless of the location of the reserves.

Not surprisingly, it is exploited species that show the strongest positive response to protection, including species thought to be too mobile to benefit from reserve protection. But I want to stress that the changes seen inside reserves are ecosystem-level changes—not just the recovery of exploited species. For example, when reserves were established in New Zealand, the increase in lobsters resulted in a major decrease in sea urchins, the lobster's prey. This, in turn allowed kelp beds to flourish (because urchins eat kelp), and the overall productivity of the area has increased.

When year-round area closures were instituted on the Georges Bank to aid in the recovery of cod and other finfish, it was scallops that responded the most quickly, becoming unbelievably abundant inside the closed areas. Thus many species can be simultaneously affected by any particular closure.

Responses occurred in reserves of all sizes, and they appear rather quickly—reserves only two to four years old showed increased levels of animal abundance and size equivalent to reserves that had been established for decades.

As I mentioned previously, not all species increase inside reserves, but the great majority show a strong positive response. Neither will all species show a rapid response, especially those that are long-lived and slow-growing. However, the overwhelming result from over 20 years of studies is that species recover within reserve borders, becoming more numerous and larger. Although local conditions may affect the exact result in any particular place, the value of reserves in generating broad changes within their boundaries has been demonstrated in scores of well-documented studies in virtually all settings. This is good news for ecosystem-based management.

While reserves cannot stop pollution, prevent catastrophes, or slow the arrival of exotic invaders into marine ecosystems, they can help to withstand these threats simply because they contain larger populations and more species. Many studies have shown that healthy ecosystems are more resilient to chronic or acute threats, and species-rich ecosystems are more resistant to invasion.

Effects outside of reserve borders

While the major role envisioned for reserves is the protection of habitats and ecosystems, there is added benefit if they export some of their population to surrounding areas. This function is particularly important when reserves are viewed as a fishery management tool, because this export could be used to replenish species subject to harvest in non-reserve areas.

The large variety of life histories, movement patterns, and time spent as a planktonic, drifting larva means that spillover will occur differently for different species. There are so few reserves established, and most of them are so small, that

there have been relatively few studies done on spillover. Nevertheless, the evidence is compelling that reserves can recharge nearby areas.

Spillover can take two forms. The first is simple movement of adult animals out of reserves. Several studies have shown that numbers and sizes of species are greater in areas near reserve boundaries, and other studies have shown that the catches of fishers near reserves are higher than in other areas. Fishermen may not have read these studies, but they often know where the fish are, and this has led to concentrations of recreational and commercial fishing activity along reserve borders, an activity known as "fishing the line".

The other major potential contribution of marine reserves to fisheries is through larval export. Most marine species produce tiny young that drift in the water for days or weeks. We know that the rate of production of young by animals inside reserves can be tremendous—at the Edmonds Underwater Park in Washington, for example, it is estimated that the large lingcod there produce 20 times as many young than are produced in equivalent areas outside. But do some of these young make their way into the fishery? There has been little documentation of the effects of larval spillover, mostly because reserves are simply too small to have much effect. The Edmonds reserve, for example, is only 25 acres in extent, a tiny fraction of the area over which the larvae produced there could be expected to drift.

In one U.S. example of a marine reserve large enough to have the potential to recharge fisheries through larval export, this apparently has occurred. On the Georges Bank, several large areas were set aside in 1994 to preserve cod and other groundfish, and as I have mentioned the strongest response so far has been in the fast-growing scallops. By 1998 scallops were 14 times more dense in the protected areas than outside, and dense settlement of young was predicted in downcurrent areas near the reserves. These areas are in fact now yielding higher catches than other areas, and overall revenues have increased from $91 Million in 1995 to $123 million in 1999.

Reserve Size and Reserve Networks

A common perception is that conservation and fishery objectives for marine reserves are incompatible, and there will be inevitable conflict between these competing interests. That is certainly what appears to be happening at this point, but models of reserve function suggest that this need not be so. It is true that the larger the reserve, the more species will be able to complete their entire life cycles inside reserves. A reserve too small will not be self-sustaining because most larvae produced in it will be transported elsewhere, and thus a small reserve needs to be seeded from a fished area. Very large reserves, on the other hand, leave little area left to in which to fish.

Most single-species fisheries models of reserves suggest that the most substantial impacts on yields occurs when between 20 and 50% of the area is set aside. The amount of area required in reserves varies, but few models show significant benefit at levels below 10%. The more depleted the fishery is on the outside, the more substantial the benefit from reserves.

Where does this leave conservation interests? To what extent can set-asides at this level work to rebuild ecosystems? Fortunately, the most recent scientific findings have suggested a solution: networks of smaller reserves. While these reserves may individually be too small for self-seeding, they are close enough together so that one reserve can seed another. In addition, networks can provide high amounts of spillover into fished areas because they have extensive borders, and networks can boost regional production of young as long as the aggregate area in reserves is sufficiently large.

Studies also suggest networks of reserves can provide additional protection against catastrophic loss (because we're not putting all of our eggs in one basket), and they may make reserve siting easier and more flexible because there are simply more options available.

Where to put a marine reserve?

Recent scientific work on the criteria for siting marine reserves has emphasized that in any management area, there are many different reserve designs that might fit the biological needs of the protected community. That is, science can suggest a range of options that can then be evaluated for other criteria, like their social, economic, or political impact. This flexibility is good news for the process of establishing marine reserves, because it can include input from many different sectors of the community in forming the final decisions.

The most important criterion for designing reserves is to include representation of all habitat types within an area, preferably adjacent to one another, simply because many species use different habitats over the course of their lives. A common

misconception is that reserves should be placed in the areas of best fishing. In fact, reserves should show the best response in areas that were formerly productive but are currently overfished—protection can allow these areas of proven potential to recover.

Conclusions

I realize that much of the regulatory process is constrained by mandated consideration of one species at a time. However, the solution to managing multiple threats to the oceans requires an integrated approach that includes the need to preserve intact marine ecosystems on a regional basis. Single species management is not sufficient for the future, especially since many fisheries already affect many different species through by-catch.

Marine reserves are one of the best tools we have to address management of entire marine ecosystems. While they are not the solution to every problem facing the coastal ocean, they can stem habitat destruction, alleviate the effects of local overfishing, simplify the simultaneous management of multiple species, and restore biodiversity within their borders. The healthier ecosystems inside reserves can be more resistant to threats from the outside, and more resilient in their recovery. A regional network of marine reserves may be the best solution for the broad enhancement of coastal ecosystems, with substantial contributions to biodiversity and recruitment of young both inside and outside their borders. While reserves are ideal tools for habitat protection and ecosystem preservation, they are best used as a complement to traditional fisheries management.

The conclusion of the summary paper that I have included in the record contains the Consensus Statement on Marine Reserves, a remarkable document signed by over 160 Ph.D. level academic scientists from around the world. The full listing of the signatures can be found on the website of the National Center for Ecological Analysis and Synthesis. The document is remarkable first because it's one of the few times I have ever seen 160 marine scientists agree on anything, and second for the force of its recommendations. Much of what it states has already been covered by this testimony, but I'd like to conclude with the last line of the statement: "Existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool."

Thank you again for inviting me to testify here today.

[A statement submitted for the record by Dr. Warner follows:]

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SCIENTIFIC CONSENSUS STATEMENT ON MARINE RESERVES AND MARINE PROTECTED AREAS

THE CONTEXT

At the 1997 Annual Meeting of the American Association for the Advancement of Science (AAAS), a symposium on marine protected areas reviewed the state of the oceans, raised a number of unresolved critical scientific issues and identified research priorities. In response, an international team of scientists was convened at the National Center for Ecological Analysis and Synthesis (NCEAS) and charged with developing better scientific understanding of marine protected areas and marine reserves. Conclusions from the two-and-a-half-year efforts of this working group are *in press* in a special issue of the journal *Ecological Applications*. This Scientific Consensus Statement is based upon those results and other research already published elsewhere. The Statement is a joint effort of the NCEAS scientists and the academic scientists participating in a meeting on marine reserves convened by COMPASS (Communication Partnership for Science and the Sea). This Statement was drafted in response to repeated requests by many fishermen, marine resource managers, governmental officials, conservation activists, interested citizens and others for a succinct, non-technical but scientifically accurate summary of the current scientific knowledge about marine reserves. Additional information on the history of this Statement, NCEAS and COMPASS appears after the Statement.

New Approaches Are Needed:

The declining state of the oceans and the collapse of many fisheries have created a critical need for new and more effective management of marine biodiversity, populations of exploited species and overall health of the oceans. Marine reserves are a highly effective but under-appreciated and under-utilized tool that can help alleviate many of these problems. At present, less than 1% of United States territorial waters and less than 1% of the world's oceans are protected in reserves.

What are Marine Reserves?

Marine Reserves (MRVs) are areas of the sea completely protected from all extractive activities. Within a reserve, all biological resources are protected through prohibitions on fishing and the removal or disturbance of any living or non-living marine resource, except as necessary for monitoring or research to evaluate reserve effectiveness. Marine reserves are sometimes called "ecological reserves," "fully-protected marine reserves," or "no-take areas." **MRVs** are a special category of **Marine Protected Areas** (MPAs). MPAs are areas designated to enhance conservation of marine resources. The actual level of protection within MPAs varies considerably; most allow some extractive activities such as fishing, while prohibiting others such as drilling for oil or gas. **A Network of Marine Reserves** is a set of **MRV**s within a biogeographic region, connected by larval dispersal and juvenile or adult migration.

THE SCIENTIFIC CONSENSUS

The first formal marine reserves were established more than two decades ago. Recent analyses of the changes occurring within these MRVs allow us to make the following conclusions:

Ecological effects *within* reserve boundaries:

1) Reserves result in long-lasting and often rapid increases in the abundance, diversity and productivity of marine organisms.

2) These changes are due to decreased mortality, decreased habitat destruction and to indirect ecosystem effects.

3) Reserves reduce the probability of extinction for marine species resident within them.

4) Increased reserve size results in increased benefits, but even small reserves have positive effects.

5) Full protection (which usually requires adequate enforcement and public involvement) is critical to achieve this full range of benefits. Marine protected areas do not provide the same benefits as marine reserves.

Ecological effects *outside* reserve boundaries:

1) In the few studies that have examined spillover effects, the size and abundance of exploited species increase in areas adjacent to reserves.

2) There is increasing evidence that reserves replenish populations regionally via larval export.

Ecological effects of reserve *networks*:

1) There is increasing evidence that a network of reserves buffers against the vagaries of environmental variability and provides significantly greater protection for marine communities than a single reserve.

2) An effective network needs to span large geographic distances and encompass a substantial area to protect against catastrophes and provide a stable platform for the long-term persistence of marine communities.

ANALYSES OF THE BEST AVAILABLE EVIDENCE LEAD US TO CONCLUDE THAT:

- Reserves conserve both fisheries and biodiversity.
- To meet goals for fisheries and biodiversity conservation, reserves must encompass the diversity of marine habitats.
- Reserves are the best way to protect resident species and provide heritage protection to important habitats.
- Reserves must be established and operated in the context of other management tools.
- Reserves need a dedicated program to monitor and evaluate their impacts both within and outside their boundaries.
- Reserves provide a critical benchmark for the evaluation of threats to ocean communities.
- Networks of reserves will be necessary for long-term fishery and conservation benefits.
- Existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool.

This Scientific Consensus Statement is signed by 161 leading marine scientists and experts on marine reserves. Signatories all hold Ph.D. degrees and are employed by academic institutions. Names and affiliations of signatories appear on pages 5 - 12.

History and Purpose of this Statement

This Statement was drafted in response to repeated requests by many fishermen, marine resource managers, governmental officials, conservation activists, interested citizens and others for a succinct, non-technical but scientifically accurate summary of the current scientific knowledge about marine reserves.

The Statement is based on work conducted primarily by the NCEAS Working Group on Marine Reserves, co-chaired by Jane Lubchenco, Stephen R. Palumbi and Steven D. Gaines. The National Center for Ecological Analysis and Synthesis (NCEAS - <http://www.nceas.ucsb.edu/>) is a scientific institution funded by the National Science Foundation, the State of California and the University of California, Santa Barbara. The mission of NCEAS is to advance the state of ecological knowledge through the search for general patterns and principles and to organize and synthesize ecological information in a manner useful to researchers, resource managers, and policy makers addressing important environmental issues. The Working Group on Marine Reserves (WGMR) was convened in May 1998 following a Symposium on The Science of Marine Protected Areas at the Annual Meeting of the American Association for the Advancement of Science (AAAS) in February 1997. Products from the Working Group have been published or are *in press* in peer-reviewed scientific journals.

The initial version of this Scientific Consensus Statement was drafted in August 2000 at a meeting on "The Science and Development of Marine Protected Areas and Fully Protected Marine Reserves along the U.S. West Coast" held in Monterey, California. The meeting was organized and sponsored by COMPASS (<http://www.CompassOnline.org/>), the Communication Partnership for Science and the Sea, a collaboration among Island Press, SeaWeb, Monterey Bay Aquarium and an independent Board of Scientific Experts. The mission of COMPASS is to advance and communicate marine conservation science. Dr. Megan Dethier and Dr. Stephen R. Palumbi coordinated the academic scientist group which drafted the initial Statement at the Monterey COMPASS meeting, following presentations by NCEAS Working Group scientists.

The intended audience for the Statement includes resource users, policymakers, non-governmental organizations, and interested citizens. Signatories are academic Ph.D. scientists with expertise relevant to reserves.

For further information about NCEAS, COMPASS, the Statement, a list of scientific products from the NCEAS Working Group on Marine Reserves or to add your name for future use of the Statement, please contact Dr. Patty Debenham pdebenham@nceas.ucsb.edu or Dr. George Leonard gleonard@mbayaq.org.

An electronic version of this Statement is available at
http://www.CompassOnline.org/ or
http://www.nceas.ucsb.edu/Consensus

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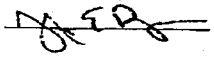

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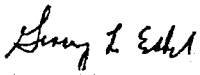

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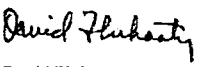

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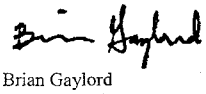

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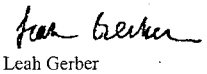

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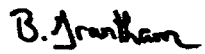

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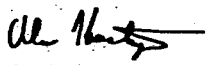

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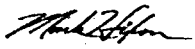

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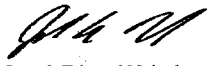

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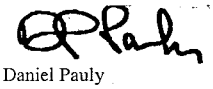

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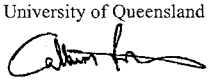

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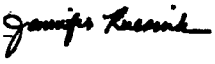

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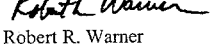

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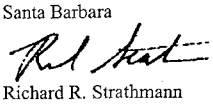

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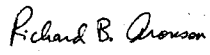

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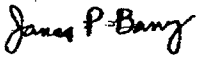

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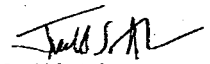

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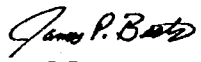

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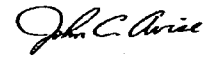

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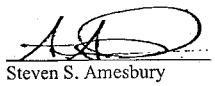

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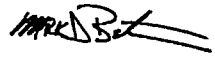

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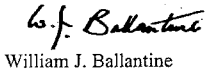

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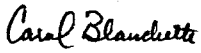

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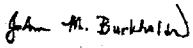

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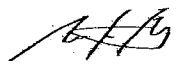

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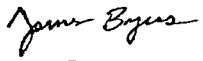

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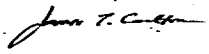

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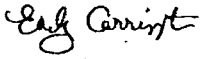

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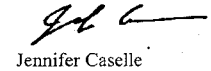

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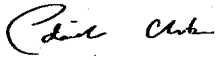

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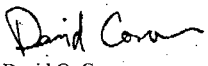

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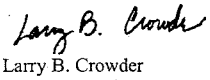

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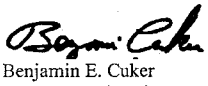

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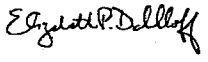

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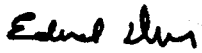

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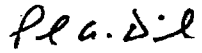

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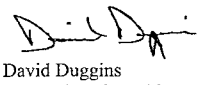

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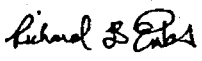

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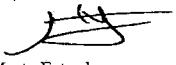

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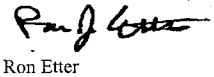

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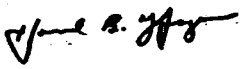
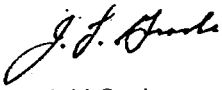
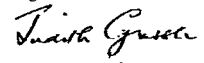
Carl Folke
Stockholm University



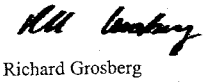
Howard B. Glasgow Jr.
North Carolina State
University



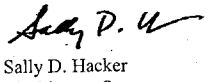
J. Frederick Grassle
Rutgers University



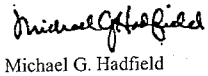
Judith P. Grassle
Rutgers University



Richard Grosberg
University of California,
Davis

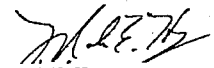


Sally D. Hacker
Washington State
University, Vancouver

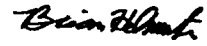


Michael G. Hadfield
University of Hawaii at
Manoa

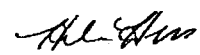
C. Drew Harvell
Cornell University



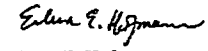
Mark E. Hay
Georgia Institute of
Technology



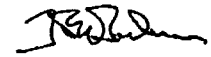
Brian Helmuth
University of South
Carolina



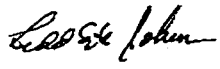
Helen Hess
College of the Atlantic



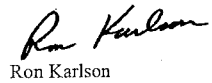
Eileen E. Hofmann
Old Dominion University



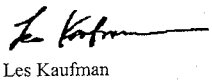
Jeremy B. C. Jackson
Scripps Institution of
Oceanography



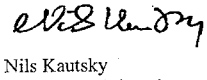
Ladd Erik Johnson
Laval University



Ron Karlson
University of Delaware

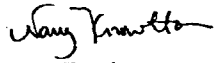


Les Kaufman
Boston University

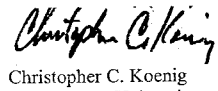


Nils Kautsky
Stockholm University

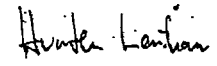
Terrie Klinger
University of Washington



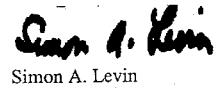
Nancy Knowlton
Scripps Institution of
Oceanography



Christopher C. Koenig
Florida State University



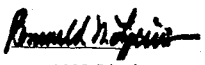
Hunter Lenihan
University of North Carolina
at Chapel Hill



Simon A. Levin
Princeton University

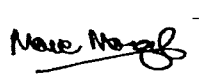
Jeffrey Levinton
State University of New York at
Stony Brook

Don R. Levitan
Florida State University



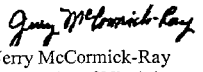
Romuald N. Lipcius
Virginia Institute of Marine Science

Michael A. Mallin
University of North Carolina at Wilmington

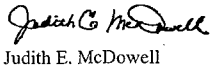


Marc Mangel
University of California, Santa Cruz

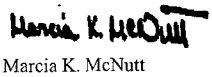
Helene Marsh
James Cook University



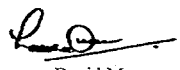
Jerry McCormick-Ray
University of Virginia



Judith E. McDowell
Woods Hole Oceanographic Institution

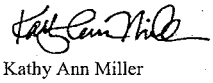


Marcia K. McNutt
Monterey Bay Aquarium Research Institute

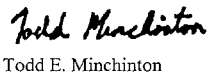


Laurence David Mee
University of Plymouth

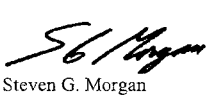
Bruce Menge
Oregon State University



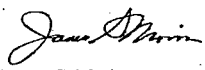
Kathy Ann Miller
University of Southern California



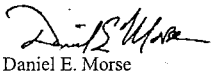
Todd E. Minchinton
University of California, Santa Cruz



Steven G. Morgan
University of California, Davis

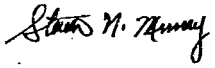


James G. Morin
Cornell University

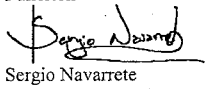


Daniel E. Morse
University of California, Santa Barbara

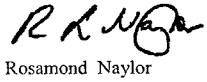
Lauren Mullineaux
Woods Hole Oceanographic Institution



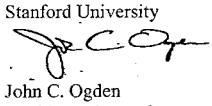
Steven N. Murray
California State University, Fullerton



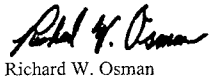
Sergio Navarrete
Pontificia Universidad Catolica de Chile



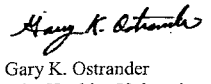
Rosamond Naylor
Stanford University



John C. Ogden
Florida Institute of Oceanography

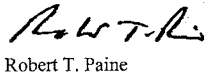


Richard W. Osman
Academy of Natural Sciences

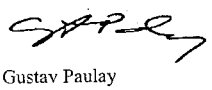


Gary K. Ostrander
John Hopkins University

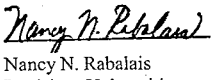
Dianna K. Padilla
State University of New York at Stony Brook



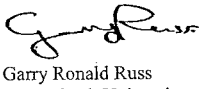
Robert T. Paine
University of Washington



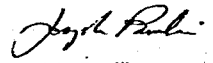
Gustav Paulay
University of Florida



Nancy N. Rabalais
Louisiana Universities
Marine Consortium

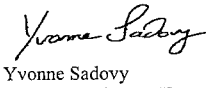


Garry Ronald Russ
James Cook University

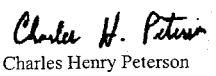


Joseph R. Pawlik
University of North
Carolina at Wilmington

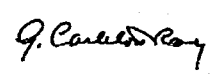
Peter Raimondi
University of California,
Santa Cruz



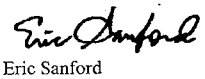
Yvonne Sadovy
University of Hong Kong



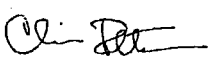
Charles Henry Peterson
University of North
Carolina



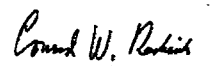
G. Carleton Ray
University of Virginia



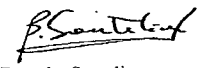
Eric Sanford
Stanford University



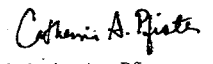
Christopher W. Petersen
College of the Atlantic



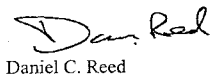
Conrad W. Recksier
University of Rhode Island



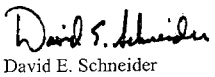
Bernabe Santelices
Pontificia Universidad Catolica
de Chile



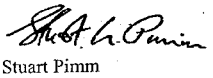
Catherine Ann Pfister
University of Chicago



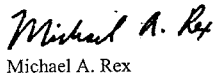
Daniel C. Reed
University of California,
Santa Barbara



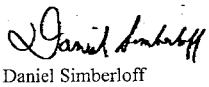
David E. Schneider
Western Washington University



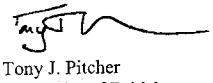
Stuart Pimm
Columbia University



Michael A. Rex
University of
Massachusetts
Boston



Daniel Simberloff
University of Tennessee



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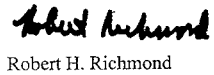

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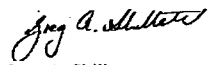

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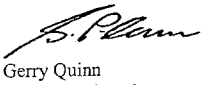

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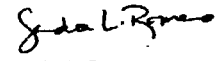

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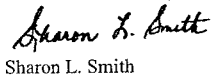

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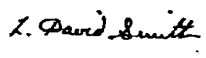

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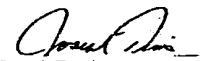

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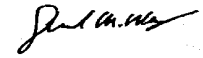

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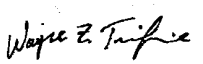

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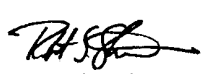

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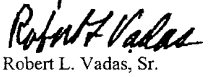

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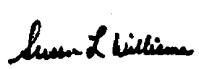
University of Maine



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Suzanne Strom
Western Washington
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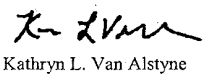

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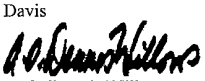

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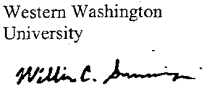

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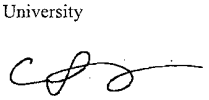

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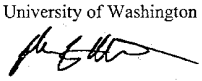
and Mary



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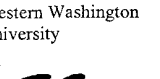

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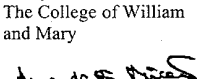

Amanda Vincent
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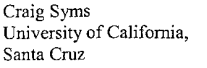

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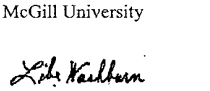

Libe Washburn
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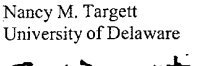

Brant W. Touchette
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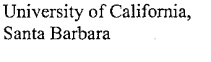

Les Watling
University of Maine

Mr. GILCHREST. Thank you very much, Dr. Warner.

Could Dr. Houde and Dr. Warner explain what you mean by networks? When you say networks in marine reserves, I am assuming that I see a corridor type of concept. What are marine reserve networks?

Dr. WARNER. A network is an alternative to setting aside simply one large area in which we might be able to conserve the maximum number of species in terms of self-seeding. For many species, we do not know how far they disperse, and we are almost certain that much of the dispersal would go outside of the small reserve. One answer is to build a very large reserve, to conserve as many species as possible.

Mr. GILCHREST. What would be a very large reserve? Would George's Bank, which is now—the two areas in George's Bank that have been set aside, would you consider those very large areas?

Dr. WARNER. I would consider those moderately large. They only cover about, depending on the species that you are talking about, between 25 and 30 percent of the fishable area there.

The idea, though, is that a network of smaller reserves may indeed encompass and allow self-seeding of species within their borders for some species but then also, because they are spread around in different places, are able to capture some of the dispersal out of other reserves, such that we then can both capture for conservation purposes species with low dispersal and species with relatively high dispersal.

Now, the nice thing about them also is that a whole series of smaller reserves have more edges than does one big reserve, and edges are where spillover occurs. So the idea overall is to designate a certain percentage set-aside in a particular area and then divide that set-aside into smaller areas in a network. The network may not necessarily be along a line of ocean currents, because I can tell you as an oceanographer that currents change over time. And it is probably a much better idea at this point to establish them of varying sizes, of varying distances over the entire management area.

Mr. GILCHREST. But the networks or the areas, the smaller series of areas would benefit from ocean currents as far as larvae and plankton are concerned, would they not?

Dr. WARNER. No doubt, but the one thing that we cannot be certain of is that species always go from place A to place B.

Mr. GILCHREST. What criteria, then, would you use to develop a network?

Dr. WARNER. I would use, as Dr. Houde—I should probably give him the floor sooner or later—as Dr. Houde described, areas of potentially high production are probably the areas of—the best places to place some of these reserves. I will point out, however, that that does not necessarily mean that they are the areas of best fishing. In fact, in terms of reserve response, some of the best places to expect a very rapid response in terms of reserves are places that used to be good fishing and now are not, where the habitat still exists or can be preserved, and then, species can recover within these areas that we know once held large populations.

Mr. GILCHREST. Thank you.

Dr. Houde?

Dr. HOUDE. Yes; I think I agree with most of what Dr. Warner has said. I would just like to say that the sea is a highly connected

kind of environment compared to the terrestrial environment. We do have three dimensions. We have water currents flowing. So if you could design Marine Protected Areas in networks, they ought to be most effective. If you knew the source areas, areas that the adult fish had their highest productivity in terms of production of eggs and larvae, we might want to protect these areas as sources to reseed or spill over into areas that are still open to fishing as a source of recruits.

But I would also like to say that you need to know a lot about the ocean environment, so this is an area where we—

Mr. GILCHREST. So do you want to leave it—

Dr. HOUDE. —need to have a lot of research.

Mr. GILCHREST. You want to leave it up to us?

[Laughter.]

Mr. GILCHREST. To designate those network areas?

Dr. HOUDE. I guess I am saying that I do not think we are quite ready to designate those networks yet.

Mr. GILCHREST. I see.

Dr. HOUDE. We think the concept is a very good one, and in fact, I think the Executive Order 13158 says that NOAA or Commerce and Interior should look into developing a framework for a network of systems of MPAs in the United States.

Mr. GILCHREST. Do you think NOAA, Commerce and Interior are moving quickly enough?

Dr. HOUDE. I am not certain that they are moving as fast as they could. Your questions earlier about why the advisory committee is not in place was a question I also might have asked, wondering why that has not taken place in the past several months.

I think the term network that has been used in that bill may be somewhat different than what we are talking about here. When they talk about network, I think they may have been referring to a system rather than a network on a national scale of MPAs, which may be different.

Mr. GILCHREST. When you mention the word network, you are talking about specific areas in reserves that are close geographically with each other, like the Gulf of Maine or the Gulf—

Dr. HOUDE. Yes, potentially quite close to each other that take advantage of the known life histories of organisms that are in an ecosystem to achieve the best production you can, including spillover to add to the fishery potential in the region.

Mr. GILCHREST. Do you think that the existing authority, statutory authority, within those three departments and the Executive Order is sufficient to develop that type of a system? Do we need to have legislation added to that?

Dr. HOUDE. I am not an expert in this area, but when we did the National Academy study, there was quite a bit of discussion about developing networks of MPAs, and we came up with examples. For instance, it might well be that to develop an effective system of MPAs, you might have to have part of a terrestrial environment connected to an estuary out onto the coastal ocean. And we then saw local, state and Federal agencies all with overlapping jurisdictions and responsibilities and authority having to duke it out, so to speak, to develop these MPA networks.

So there may well be a need, but I am not an expert and could not—

Mr. GILCHREST. We do that all the time up here, duke it out. We do most of our duking before we get here—at least, it is better that way. We duked out before the markup. We were pretty pleasant about it, I think, I hope.

One quick question to Dr. Shipp in relation to Marine Protected Areas and are they appropriate for a management tool for various species, and in several cases in your written testimony, you seemed to suggest that no-take reserves may be particularly effective for rebuilding stocks that are at very low levels. Could you give us a comment on Red Porgy and Gray Triggerfish in the Gulf of Mexico?

Dr. SHIPP. Yes, and the Red Porgy comments were derived before I spoke to Bob Mahood. I assumed that Red Porgy was in terrible shape, and it was in terrible shape. Bob Mahood, who is the executive director of the South Atlantic Fishery Management Council says that they are recovering very rapidly with traditional management measures.

The Gray Triggerfish, on the other hand, in the Gulf of Mexico, is a species that has received intensive fishing pressure because of the limitations on Red Snapper, which have been put on when that stock was in such decline, and therefore, Gray Triggerfish, even though officially, it is not overfished, all of us know that it is. And we have also learned that it is a relatively sedentary species that undergoes very little migration.

So that is one of the species that I think would very much be appropriate for a Marine Protected Area if we could designate sites that are the best for the Gray Triggerfish. However, you know, once they are recovered, then, my feeling is that the need for the MPA as far as production and yield is concerned would not be necessary. I agree with my colleagues on about 85 or 90 percent of their comments. It is just that there are some yellow flags on this harvest potential.

Mr. GILCHREST. Thank you very much.

Mr. Underwood?

Mr. UNDERWOOD. Thank you, Mr. Chairman, and thank you all for your testimonies, and I especially thank Gerry for coming this far to give us good reason to think seriously about Marine Protected Areas and particularly with regard to community involvement and broad-based community support. That has been a very strong feature of the Marine Protected Areas program in Guam, and even then, there is always still some controversy there, still people who disagree with it, and I have heard from those individuals as well, let me assure you; and also to Gerry for providing good reason why we should go to Guam, Mr. Chairman.

Mr. GILCHREST. Guam and Minnesota.

[Laughter.]

Mr. UNDERWOOD. In that order.

[Laughter.]

Mr. UNDERWOOD. The area that he was identifying as the top tourist destination, I went to a high school when I was in high school that was just above that area, and when I was in high school in the sixties, that area was not pristine, but very clearly, when you would go into the water, you could see a wide variety of

species almost immediately. And now, you know, as a result of the Marine Protected Area, some of it is coming back.

I am interested in many of the points that have just been made by the Chairman. I note, Dr. Shipp, I know that to some extent, you have been overadvertised as being critical of MPAs, and I understand the clarification that you have given about the belief that MPAs as a fishery management tool perhaps is, you know, oversold. Maybe that is the term, and you made mention of the fact that the migratory nature of various species makes it not as effective as perhaps commonly assumed. Am I characterizing that correctly?

Dr. SHIPP. Yes, Mr. Underwood, you certainly are.

Mr. UNDERWOOD. OK; Dr. Warner or Dr. Houde, how would you—how could you respond to that, not to create, you know, any controversy.

Dr. WARNER. I promise I will not hit him. That is all right.

[Laughter.]

Dr. WARNER. If indeed most of the species that are intended for protection are as mobile as is characterized by Dr. Shipp, then, the results of these dozens, scores of studies of responses inside reserves, particularly for exploited species, should not be true. If the species are moving out of the reserves very quickly, then, there will not be a response inside of reserves, and we have seen larger, bigger fish inside reserves, including some species that would be characterized as quite mobile.

On the other hand, if species are moving a very great deal in and out of reserves constantly, then reserves will have virtually no effect on the fishery. They might be in the reserve at one point; they will be on the outside of the reserve at another point.

Mr. UNDERWOOD. Thank you.

Dr. Houde?

Dr. HOUDE. I think I generally agree with Dr. Shipp in most of his analysis here, that the species that are likely to be most protected by Marine Protected Areas are those that are mostly sedentary. In fact, the reef-tract environments that you, Mr. Underwood, and Mr. Davis talked about are probably the kinds of marine ecosystems that will provide, or that MPAs can provide, the greatest benefit.

The increase in biomass and age and fecundity of fish within those areas, as Dr. Shipp has pointed out, could be achieved by other methods if they were reliable. And that is the problem: in many cases, the science that we use for stock assessment and the management measures that we have applied in a conventional way which try to regulate the catch and try to regulate the amount of effort that goes into it are not always reliable. So the oldest argument for MPAs is that we have uncertain science and uncertain management, and MPAs are a good form of insurance I think still does apply.

But I will agree with Dr. Shipp that conventional methods, which essentially try to limit the fishing mortality rate, can be effective. And we are seeing some of the results of that, I think, at least on the East Coast of the United States since the 1996 reauthorization of Magnuson-Stevens.

On the other hand, on the West Coast, I do not think that we have seen so much recovery; in fact, declines. And the kinds of fish that Dr. Warner is probably very familiar with, the Pacific Rockfishes, a group of about 60 species of fish that are exploited are quite sedentary at least during their juvenile through long adult lives are the kinds of stocks that MPAs could achieve, I think, some very big benefits.

Mr. UNDERWOOD. Well, your comments have kind of cast a different light on the role of MPAs in my own mind just thinking about this. Are you saying that had all the other kinds of approaches that we used before we used MPAs, had they been scientifically based, perhaps we would not have a need for MPAs?

Dr. HOUDE. No, I am not saying they were not scientifically based. They are scientifically based. There is a lot of uncertainty in fisheries science that will never be overcome. I think the public thinks that the uncertainty is equated to poor science. It is not necessarily. It is related to these changes in the environment, the El Ninos, the other kinds of things that take place on decadal scales that are really difficult to predict and may not be predictable, at least in the next couple of decades.

So that uncertainty means that using these spatial methods, setting aside some areas to account for the uncertainty, is good insurance.

Mr. UNDERWOOD. Kind of a last resort?

Dr. HOUDE. Yes, I would not be so bleak as to call it a last resort, but it is insurance.

Mr. UNDERWOOD. A last resort that needs legislation?

Dr. HOUDE. In my written testimony, I said I did not think there was a need for a national standard in the Magnuson-Stevens Act for MPAs. I did say, though, that I thought that in my mind, it would be very advisable to put some strong supporting language into the Magnuson-Stevens Act that talked about spatial management; that related it to essential fish habitat and to the conceptual idea of developing fishery ecosystem plans, which I think is a good one, and we hoped that we would essentially move to.

Mr. UNDERWOOD. Well, you know, just going to Gerry Davis' presentation, where he outlined a process that took roughly 14 years to get everyone to kind of buy into it, and in an area, in a coral reef environment, where with an MPA you could almost immediately see the benefits. And I know it is far different in other areas.

Maybe Mr. Gilmore or the rest can speak to the issue—are the problems that we are having with MPAs based in some way—perhaps we are not adequately explaining it, or we are not adequately dealing with recreational and cultural interests and social interests and other interests in the communities involved? I mean, obviously, a lot of the discussion that we are having today could be immediately discounted by a large part of the public, because, simply, it is very difficult to comprehend all of it, you know.

As the Chairman added, has noted, we duke it out here, and sometimes, we duke it out without all of the facts or in complete agreement—most of the time in ignorance of many of the things that we are talking about. But it seems so critical that to me, at least, that if you do not get people to buy into it at some level, you

are just going to create the opportunity for failure no matter what the science says, no matter how strongly you make the case.

And since Mr. Gilmore has perhaps had a slightly different perspective, maybe he would like to address that.

Mr. GILMORE. Well, thank you, Mr. Underwood.

I guess the point in my testimony today is not a fear of Marine Protected Areas. It is that we have entered into this Executive Order, and NOAA itself has said, well, we have not really defined what a Marine Protected Area is. We have had vigorous discussions at the North Pacific Council over the last two decades about Marine Protected Areas, but all of those closures shown in my testimony were negotiated out in the regional fishery management council process with a lot of stakeholder input. I think they qualify as Marine Protected Areas, and we are in a very intense discussion right now, implementing the essential fish habitat provisions from the Sustainable Fisheries Act. That entails developing an environmental impact statement and choosing candidate sites for additional Marine Protected Areas probably with more of an emphasis on protecting sensitive habitat than the management measures to date, which have been to reduce interactions with marine mammals, including walrus concentrations or Steller sea lions, or to avoid trawling in crab nursery grounds, for example.

So I think the basis of the debate is—it shifts rather quickly when you start talking about equating a marine reserve and a Marine Protected Area, although almost all of those management measures that I point out have closed—those 30,000 square miles have been closed to trawling but not all fishing activity. Crab fisherman, for example, are allowed to fish those areas.

So I do not think the industry anywhere around the country has a problem with Marine Protected Areas. I think we have probably been creating MPAs for a long time. The positive aspect of the Executive Order is to call for an advisory committee to be set up and to try to bring some order to developing MPAs so that people can operate in one environment, and as stakeholders, they know that they are afforded one-stop shopping, and they do not have to worry about different agencies within Commerce and Interior and EPA and everybody else having their own version of MPAs.

Mr. UNDERWOOD. Thank you very much, and thank you very much for the hearing, Mr. Chairman. I hope that we get that advisory council on board very quickly. And just to note, Mr. Gilmore talked about crabbing. You know, is there such a thing as catch-and-release crabbing?

[Laughter.]

Mr. GILCHREST. Oh, sure. My wife does it all the time.

Mr. UNDERWOOD. Thank you.

[Laughter.]

Mr. GILCHREST. She does not like to hurt those little critters.

Mr. UNDERWOOD. I would just point out that Mr. Davis has a 50-pound coconut crab at his house.

Mr. GILCHREST. A 50-pound coconut crab?

Mr. DAVIS. And it is 106 years old, too.

Mr. UNDERWOOD. And just one more thing: I would like to insert into the record a statement by the National Resources Defense Council.

Mr. GILCHREST. Thank you, Mr. Underwood.

[The statement of the National Resources Defense Council submitted for the record follows:]

Statement of the Natural Resources Defense Council on Marine Protected Areas

To the Members of the Subcommittee,

The Natural Resources Defense Council is a national, non-profit organization dedicated to protecting the environment. NRDC has more than 500,000 members. We believe that marine protected areas (MPAs) are an essential part of comprehensive ocean management—including the perpetuation of sustainable fisheries and the conservation of the ecosystems on which fisheries depend. We strongly support the creation of marine protected areas, particularly no-take marine reserves, in U.S. waters based on sound science and public input.

Existing fisheries management techniques have not been sufficient to keep marine life and habitats from declining. More than a third of known, managed fish populations are considered overfished, and the proportion of species whose status is unknown continues to grow. The American Fisheries Society recently identified more than 80 species of marine fish at risk of extinction. Overfishing and indiscriminate fishing gears have destroyed habitats and intricate food webs, making the ocean we see today very different from that of fifty or one hundred years ago. Bringing back these species and habitats is expensive, time-consuming, and extremely difficult. When management fails, the costs are high not only for fish but also for fishermen. We need to improve fisheries management so that we increase protection for populations in danger, and help insure the oceans against future collapses. Marine protected areas are a key part of this improvement strategy.

The benefits of no-take marine reserves have been proven by hundreds of peer-reviewed, scientific studies. Habitats in marine reserves remain undamaged by fishing gear. Fish inside reserves are more numerous, bigger and more productive, and more diverse than in unprotected areas. Areas that have been subject to fishing pressure have fewer top predators—not only larger species such as sharks, but also fish like California sheephead, which keep kelp forests thriving by eating sea urchins. Marine reserves are also one of the only effective tools for managing emerging fisheries. When new fisheries start up, it may take years before management can catch up with fishing activity. Since marine reserves protect all species inside their borders, they keep at least a small portion of the population off the landings dock and allow managers a glimpse at what the unfished populations might resemble.

In some cases, limited take MPAs can also offer substantial benefits. One good example is the Sitka Pinnacles closed area in Alaska, where only bottom- fishing is prohibited to protect rockfish spawning grounds. However, by not safeguarding both predators and prey throughout the water column, we lose the opportunity to have an undisturbed reference site against which to measure the effects of management in other locations, as in the case of no-take reserves. For instance, the tiny existing reserves on the West Coast have larger fish populations than adjacent sites, despite enduring the same fluctuating oceanographic conditions. The only difference between the sites is fishing. This information allows for direct, quantitative analysis of management effectiveness.

There is no question that marine reserves work, but we do not expect them to singlehandedly replace all other management tools such as gear and effort restrictions. MPAs must be complemented by appropriate fisheries management outside the area, as well as appropriate regulations to safeguard water quality. Effective enforcement is also critical, making reserves sometimes preferable to MPAs because enforcement is simpler. Enforcement absolutely depends on involving the public early and often in the decision process of siting reserves. NRDC has supported public involvement throughout efforts to create MPAs in the Florida Keys and in California, and we will continue to do so. However, MPAs must be based on sound ecological information if they are to truly succeed. Too many of the MPAs collected in NOAA's list under Executive Order 13158 offer no real protection for the wildlife and habitat inside them, restrict few or no destructive activities, and were not sited to act as a network and thus provide the maximum benefits. These MPAs should be improved through scientific and public review so that it can contribute to the sustainable fisheries and resource protection mandates of U.S. law.

MPAs have strong support from the public. The most recent nationwide poll found that more than 80% supported creating protected areas in the ocean, particularly in National Marine Sanctuaries. A California poll taken in February of this year found that not only did 71% of voters support fully-protected marine reserves, but

that the support remained high even among fishermen after they were told they might lose the ability to fish those areas. Americans recognize that the ocean is a public resource that deserves to be protected for all of us and for future generations.

Mr. UNDERWOOD. Thank you.

Mr. GILCHREST. Just a closing comment, because we would like to continue to pursue your input into this area so that we can be a part of the executive branch to develop a more—to develop some clarity as to the purpose and the goals that the Administration is now pursuing. So all of you can help us understand one of the most important aspects of MPAs and what we should do, and what part we ought to play.

Dr. Houde, I would just like to read part of the bill that we marked up this morning related to MPAs, and in the coming weeks, maybe we can work actually with all of you if you see the need to change any of that. None of the amendments today dealt with this language. Maybe they did not know about this language. I am not sure.

But in the area that we call miscellaneous parts of the Magnuson Act, here is the language: Designate closed areas, seasonal closures, time closures, gear restrictions or other methods for limiting impacts on habitat, limiting by-catch impacts of gear, or limiting fishing impact on spawning congregations in specific geographic areas. Now, that is the authority, slightly enhanced although not greatly enhanced, that is now given to the councils. We can get you a copy of this, and if there is any area that you think that we ought to change or emphasize, change some of the language or emphasize something else, we would appreciate it. Dr. Houde?

Dr. HOUDE. Well, I would be happy to communicate with you about that language, as I am sure all of us here at the table would be.

Mr. GILCHREST. Thank you. And these are discretionary provisions for each council now.

Dr. Houde, Dr. Shipp from Southern Alabama, Mr. Gilmore, Mr. Davis, Dr. Warner, we hope you feel that your presence here was useful and productive, because we certainly did, and we respect that you took so much time out of your careers to come here to Washington and travel such great distances.

We appreciate it. We will take your counsel under advisement. We hope to communicate with you over the next coming weeks and months.

Thank you very much. The hearing is—

Mr. UNDERWOOD. Oh, Mr. Chairman?

Mr. GILCHREST. Mr. Underwood?

Mr. UNDERWOOD. Will the record be left open for a week and additional comments?

Mr. GILCHREST. The record will be left open for a week for the continental U.S. and for 2 weeks for outside the continental U.S.

Mr. UNDERWOOD. Thank you.

Mr. GILCHREST. The hearing is adjourned.

[Whereupon, at 1:32 p.m., the Subcommittee adjourned.]

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