MANAGING *Our Nation's* FISHERIES

Past, present and future

Proceedings of a Conference on Fisheries Management in the United States
Washington, D.C., November 13-15, 2003

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Fisheries Management in the United States

Held in Washington, D.C., USA

November 13-15, 2003

David Witherell, Editor

The conference was sponsored by the eight Regional Fishery Management Councils and NOAA Fisheries.

New England

Mid-Atlantic

South Atlantic

Caribbean

Gulf of Mexico

Pacific

Western Pacific

North Pacific

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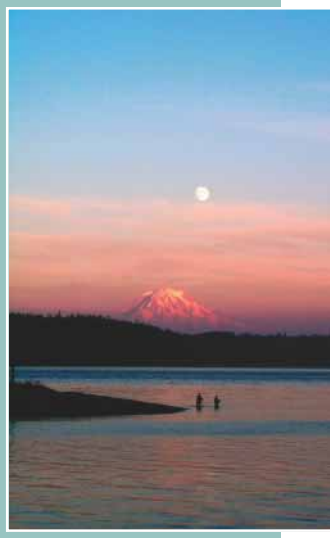

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Preface

It is imperative that the marine fisheries of the United States be wisely managed. Our marine resources are an important food source for consumers in the U.S. and abroad. Commercial and recreational fisheries for these resources are a source of employment for hundreds of thousands of people working as fishermen, processors, fishing guides, gear suppliers, and a variety of other support industries. Fisheries are an important part of the U.S. economy, and at a more local level, are critical to the economies of numerous coastal communities. Yet the harvesting of these resources can impact marine ecosystems, and managers need to ensure that future generations will be able to have the same benefits and opportunities we enjoy today. As stewards of these marine resources, we seek to understand, evaluate, and improve our nation's fishery management programs.

In early 2002 the eight Regional Fishery Management Councils, and the leadership within NOAA Fisheries (NMFS), decided that the time had come for a national conference to be held in Washington, D.C., with the purpose of providing a forum to assess the status of our marine fisheries management programs, at a national and regional level. In addition to recognizing the successes of our management program, the conference would provide an opportunity to explore potential improvements to national fishery management policy, particularly given that the Magnuson-Stevens Fishery Conservation and Management Act (MSA) is soon due to be reauthorized by Congress. This conference would be the first-ever fisheries management conference co-sponsored by the eight Regional Fishery Management Councils and NOAA Fisheries, partners in the management of our nation's fisheries.

The conference, "Managing Our Nation's Fisheries — Past, Present, and Future," was held November 13-15, 2003, at the Omni-Shoreham Hotel and Conference Center in Washington, D.C. The conference was open to the public, and over 700 people registered and attended, including fishermen and other fishing industry participants, fisheries managers, scientists, academics, environmental organizations, Congressional staffs, media, U.S. Ocean Commissioners, Pew Oceans Commissioners, native/community leaders, Regional Council members and staff, federal and state fisheries agencies, and other interested members of the public.

(Scenes from the conference, left to right)
Omni-Shoreham Hotel.

NOAA Fisheries booth.

Admiral Collins and Vice Admiral Lautenbacher with the Western Pacific delegation.

Conference attendees chat between sessions.

Vice Admiral Lautenbacher and Laural Bryant display the new NOAA Fisheries poster created by Ray Troll and Terry Pyles.

The conference organizers set out to achieve multiple objectives:

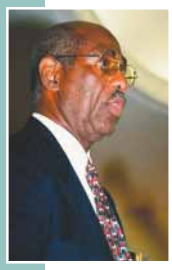
- Educate the public, policy makers, and media on the fishery management process;
- Highlight successful management by region and current management and research initiatives;
- Help bridge the gap between perception and reality regarding fisheries management;
- Provide a forum for information exchange; and
- Solicit a wide range of perspectives on future management and marine research directions.

The conference agenda was designed to meet these objectives through four different approaches: keynote addresses by high level policy makers, presentations describing the management programs in each of the eight regions, discussions by expert panelists on pressing management issues, and poster presentations. Keynote speakers included U.S. Senator Ted Stevens from Alaska, Deputy Secretary of Commerce Sam Bodman, Under Secretary Vice Admiral Conrad Lautenbacher, Chairman of the U.S. Commission on Ocean Policy Admiral James Watkins, and Commandant of the U.S. Coast Guard Admiral Thomas H. Collins. Presentations by each of the Regional Fishery Management Councils provided an overview of the current fishery management programs across the country. Ten panels discussed contemporary issues in fishery management, and shared ideas on how to address each issue in the coming years. A poster session, that included 58 posters, provided an additional venue for sharing information.

Like many meetings, attendees also share information through informal discussions over coffee and at organized evening events. The conference reception and banquet provided a great opportunity for all attendees to further discuss issues and exchange perspectives, while enjoying a superb meal prepared by the hotel chefs and listening to the evening's keynote speaker, Admiral Thomas Collins. An evening reception hosted by the Marine Conservation Alliance was also well attended, and attendees enjoyed a bounty of Alaska seafood including king crab, scallops, cod, sablefish, pollock, and salmon.

The success of this conference was due to the dedication of a number of individuals. Chris Oliver, Executive Director of the North Pacific Fishery Management Council, took the lead in organizing the conference, with the assistance of a Conference Organizing Committee consisting of Council and NOAA Fisheries representatives (David Benton, David Witherell, Kitty Simonds, Chris Moore, Marla Trollan, Gregg Waugh, Jack Dunnigan, Jim Balsiger, and Sue Salveson), and with the input of the other Council Executive Directors. Professional conference organizers Jeanne McKnight and Lisa Brandli handled many of the logistical details and worked with the hotel staff to ensure a successful conference and banquet. They also worked with Council and NOAA Fisheries public relations staff (Marla Trollan, Susan Buchanan, Laural Bryant, Gordon Helm, Pat Fiorelli, Kim Iverson, Jennifer Gilden,

(Photos, top to bottom)
Stephanie Madsen.
Tom Hill.
Robert Shipp.
Rebecca Lent and Manny Cruz.
Roger Rufe.
Ed Rasmuson.
Paul Howard.
Jack Dunnigan.
Margaret Spring.
Clarence Pautzke.



Wende Goo, and Sheela McLean) to prepare conference written materials, as well as the conference website *www.managingfisheries.org*. Many other people, too numerous to name individually, also assisted with the organization of the conference and preparation of written materials. Last but not least, the conference itself would not have been successful without the excellent contributions of the keynote speakers, regional presenters, panel moderators, panel participants, and poster authors. These contributors are individually identified within their respective sections of the proceedings.

These proceedings were prepared based on presentations and discussions from the conference. The keynote papers were transcribed from the speeches. The regional papers were provided by staff from each Council office, and were edited to achieve some consistency among the types of information presented. The panel summaries are a synopsis of each issue, as drawn from the panel presentations and the answers to questions from the audience. The summaries were drafted by the rapporteur and/or moderator of each panel, and were peer reviewed and edited for style and content. The poster abstracts are as submitted by the authors, with only minor edits done. Contact information for each poster author is provided for readers interested in obtaining more information.

I think you will find this proceedings book to be an informative and useful contribution to the literature on marine fisheries management. I believe this is a very unique publication, compiling for the first time in a single book, a comprehensive review of U.S. marine fisheries management, covering each of the eight management regions established by the Magnuson-Stevens Act. I also believe these proceedings represent a timely contribution to the national dialogue on the most important, contemporary issues in marine fisheries management. When designing the proceedings, the organizing committee decided that we needed to produce something other than a dry scientific-type publication. Rather, we aimed to make the proceedings easy and enjoyable to read by everyone interested in fisheries management.

It was my pleasure to serve as editor for these proceedings. I hope you enjoy reading this book as much as I enjoyed working on it.

David Witherell
Deputy Director, NPFMC
Editor

(Photos, top to bottom)
David Benton.
Dave Whaley.
Rebecca Lent.
Jon Sutinen.
Phil Anderson.
Virdin Brown.
Kitty Simonds.
David Cupka.

Section I.

Welcome and Opening Remarks

Chris Oliver

Executive Director
North Pacific Fishery Management Council

On behalf of all eight Regional Councils around the country and NOAA Fisheries, it's my pleasure to welcome you to this conference, the first ever of its kind. When we conceived the idea for this conference, it was with the intent of providing a single national level forum to showcase our fisheries management process, to highlight its success, to recognize areas for improvement, and to discuss the direction that our fisheries management programs are taking. And I think it's clear from the turnout that the timing was right for this event.

Over the next three days, we are going to examine where we've been in fisheries management, where we are now, and where we are heading in the future. And contrary to some of what you may have heard in the recent weeks, we are not here just to hold a press conference. We are not here just to say everything's okay and go home. However, we do believe that many of our fisheries management actions in every region have been poorly documented or inaccurately portrayed. In many cases, we believe they have been intentionally misrepresented by groups trying to advance particular agendas.

We do think that one of the benefits of this conference is going to be to set the record straight by providing facts and evidence of our successful programs, and we believe that this national forum, with the Councils and the NOAA Fisheries side-by-side is the appropriate time and place to recognize these achievements, both nationally and at the regional levels. We believe we needed a national forum to provide a report to our nation's leaders and to the American public — a report card, if you will, on how we are managing our marine resources.

We believe that such a report should properly recognize the successes of our management process, both regionally and nationally. We also know there are areas for improvement, and another primary purpose of this conference is to provide a forum for discussing those issues, and help chart a course for addressing them. We hope to illustrate what is working, identify what is not working, and what needs strengthening. Finally, we hope this conference will begin the process of improving communication to all our stakeholders, including the general public, how we are doing in terms of managing these fisheries.

As you know, our fisheries management process is a unique partnership between the Regional Fishery Management Council system and NOAA Fisheries. Included in that partnership are the affected industry, coastal states and the American public. The process is guided by a number of laws and legislation, most notably the Magnuson-Stevens Act. And with reauthorization of the Magnuson-Stevens Act on the horizon and the recommendations from the U.S. Ocean Commission also pending, we believe this conference will provide a timely dialogue on a number of the most important issues.

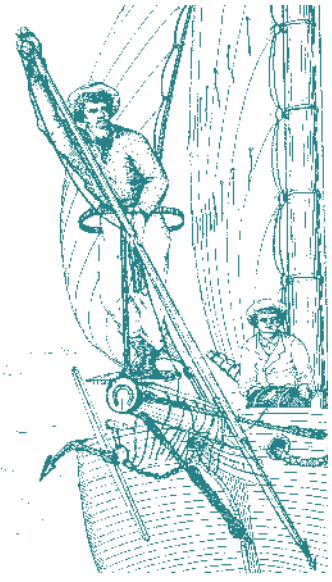
We have a number of panels set up over the next three days to facilitate that dialogue, covering some of the most visible and critical issues, from bycatch to habitat protection to ecosystem considerations, use of rights-based management programs, and coordinated marine research, as well as others.

When we put together the membership of these panels, we tried very hard to get a cross-section of representation of people interested in fisheries management by including fisheries managers, scientists, academics, and representatives of environmental groups — including some of our most vocal critics. Those panels, which run concurrently, were designed to allow time for discussion among the panelists as well as audience and question and answer participation from the audience.

We don't necessarily anticipate consensus recommendations coming out of those panels. We have a diversity of panelists. We do expect to hear a number of individual recommendations and we certainly hope those panels will identify major issues, information needs, and start that important dialogue on these issues.

Another important component of the conference is the regional presentations. Each of the eight regions is going to have about a half an hour to describe their management process, their management programs, their successes, their challenges, and hopefully have time at the end of each for a few questions, as well.

We are extremely pleased to have some very distinguished speakers to kick off this conference. We're going to open the conference today with keynote addresses from Senator Ted Stevens, Deputy Secretary of Commerce Sam Bodman, and Undersecretary Vice Admiral Conrad Lautenbacher. Tomorrow morning we will hear from Admiral James Watkins, Chair of the U.S. Ocean Commission. And tonight at our evening banquet, Admiral Thomas Collins, Commandant of the U.S. Coast Guard, will be our featured speaker. Before our keynote speakers, I would like to introduce Dr. Bill Hogarth, head of NOAA Fisheries, who would like to add some opening remarks.



Dr. Bill Hogarth

Assistant Administrator for Fisheries, NOAA

It's nice to be here and see so many people come out and discuss fisheries in the U.S. In the essence of time, I'm not going to take much time because I feel like we've got three speakers to follow that you really need to hear from, and you talk to me all the time and — so, I just want to say a couple things.

First off, I think the Magnuson-Stevens Act has worked. If you look all across the country to what's been accomplished since 1996, you'll see that we've rebuilt many stocks and we've taken them off the overfishing list and we're making progress. We have 70 rebuilding plans in place. So, things are not doom and gloom. Things are really improving. And I think the goal is to continue this movement forward.

We have a 60 billion dollar industry; 60 billion dollars to the gross national product. Folks, it's a big business. And my goal is to operate it more as a business. We need to be able to plan better to fish. If you're a commercial fisherman, you need to have a better opportunity to know when you want to fish, when it's safe to fish, when the markets are right. We need to make sure that you have more control of when you fish.

A recreational fisherman needs to be able to go fish. If you're a charter boat captain, you need to be able to advertise when your season is instead of not knowing and not know from one day to the next when it's going to be closed. And we can do this, working together with the Councils.

I'm a firm believer in the Council system. I think this is a process that was set up to get public input. I think it has. We talk about Council representation, that's something else, but I think we do get good representation with the state directors and the people on the Councils, so I think we do get the representation. Plus with all the advisory committees that the Councils use, there's a good input for everyone that wants to get involved in the process.

I am concerned with the fact that we're importing about 75% of our seafood from other countries. I'm not sure that we do the inspections that we need to. We just signed a Memorandum of Understanding with the Food and Drug Administration to get involved more in the inspections. That's something we haven't been doing, but we will be doing it.

In our shrimp industry, we're importing 90% of the shrimp in the U.S. We're having a hard time competing with the imports with aquaculture from abroad. We have challenges that we need to address in the shrimp industry. We need to deal with bycatch. We need to deal with stabilizing the industry, but we can do that and we will do it in the future.

I've been in this job about three years. We have total support from the Administration. I could not ask for better people to work for, from the Secretary to the Deputy Secretary and Admiral Lautenbacher. We are given the opportunity to do the job and we're trying to do it. When you criticize the Councils, you're criticizing me, because we have the final say-so in what goes on.

So, let's work together. Let's try to get the American public the facts. Let's try to be positive about our fishery, because it is a positive fishery, and those issues we need to deal with, let's deal with them.

Senator Ted Stevens

U.S. Senator from Alaska

Thank you all very much. It is really a joy to see so many people here. I congratulate you on holding a national meeting such as this. Thank you Stephanie (Madsen, North Pacific Council chair) for those kind words. And thanks also to NOAA for being here. These eight regional councils and NOAA put this together and I think it is a significant event. Events like this help educate the public about the country's success in managing our fisheries resources. I've got people like Admiral Lautenbacher, Sam Bodman, Bill Hogarth; that's a great team to work with to get ready for the re-authorization of the Magnuson Act. NOAA in my opinion is doing a fine job in Alaska. Our state is grateful for our Nation's commitment to our fisheries.

I was just sitting there thinking about the Magnuson Act. When I was a young senator, I went to Kodiak and I commandeered a navy plane. The navy had a base there at the time. It was just about Christmas time and we flew up the Pribilofs in a Navy Albatross. As we flew, I counted about ninety Japanese trawlers that were in Alaska waters, and they were (in those days) there year round almost. I got to talking to Senator Magnuson about that and we devised the Magnuson-Stevens Act and went into a series of hearings on it. People forget that our goal was to extend our Nation's boundaries on the seas so that we could protect our resources to the 200 mile limit and so that we could provide a new kind of management scheme. We set out to address the issue of sustainability in our fisheries. Our solution sought improved management of marine resources and recognized that fisheries off our coast require area-specific management. We determined that "one size fits all" would not fit all in fisheries off our coast.

When Congress enacted our bill, Congress set in motion the most successful federal-state management program ever devised. Our plan created federal-state management on a regional level. Just think of that. We delegated to the councils a portion of the federal authority (and the state did likewise). The concept has worked.

The Act ensured that we will manage our resources and sustain our fisheries, I believe, for generations to come if we can sustain this against the current attacks that are being made on this management process. The Magnuson-Stevens Act is not an Act to protect fishermen, boat owners, processors, consumers, or state and national prerogatives. It is an Act that protects the basic reproductive capacity of our fisheries to assure that the resource will be available to Americans for generations to come.

As you know, I am most familiar with the North Pacific Council's course of action. It resembles, I believe, the actions taken by the rest of the councils here. Our regional council has simply required that sound science and conservative management measures remain in place for the fisheries under its jurisdiction. For 25 years, annual catch limits for the North Pacific groundfish have been set at or below the acceptable biological catch level recommended by federal scientists. Pollock biomass in the Bering Sea is currently near all-time high level, with an acceptable biological catch level of 3.54 million tons in 2002. Our North Pacific Fisheries Council set the total allowable catch at only 1.5 million metric tons. We have protected the reproductive capacity of pollock — today it is four to five times the size of pollock biomass at the time this Act was enacted.

I reference the success the North Pacific Council has had with managing groundfish fisheries in the Bering Sea, as an example of the great potential that is yet to come as other regional councils start more intensive management and in a sustainable and environmentally sound manner.

Now, more than ever, regional councils strive to defend their process and to bring all sectors together to craft balanced approaches to marine resource management. We all know that is a daunting task; it won't be accomplished easily.

We are in a defining period for regional councils and fisheries management policy in general. Recommendations from the U.S. Commission on Ocean Policy will shape the debate about future policy regarding the management of our nation's marine fisheries. Congress will, I believe, listen closely to the Commission's recommendations.

Let me say parenthetically that Ed Rasmussen is here. I asked that Ed be appointed to that national Commission, as his father was head of the North Pacific Fisheries Council and the family has had a substantial involvement in our fisheries on an advisory basis. And during the time of the Magnuson-Stevens Act drafting, I talked to his father Elmer quite often. And I do believe, Ed, you have done a great job and I do thank you for participating. We are looking forward to the Commission's recommendations.

"The Magnuson-Stevens Act is not an Act to protect fishermen, boat owners, processors, consumers, or state and national prerogatives. It is an Act that protects the basic reproductive capacity of our fisheries to assure that the resource will be available to Americans for generations to come."

Resource managers, marine scientists, and policy advocates in this conference room must be ever vigilant about the motives and intentions of competing groups that wish to steer the debate away from sound science and balanced resource management and toward draconian mandates and absolutes.

Only a terrible and misguided ocean policy would recommend locking up our waters or creating vast "marine reserves" where no activity at all can take place just for the sake of doing it. Mechanisms already exist to protect sensitive marine areas based on sound science and with stated purposes and articulated goals. I would like to remind all in this room: as we have learned with land-based resource management, if a resource is closed down, it is nearly impossible to reopen it.

In the North Pacific alone, there are over 100,000 square nautical miles of marine environment already either completely off limits to any fishing or strictly restricted to protect critical habitat. And those are areas that are designated by our regional council. We involved in Alaska politically, and in the management of resources, support that effort. Those areas were designated by the regional council based on stated objectives that will allow for both the sustainability of the resource and the viability of the industry and communities that depend upon that resource.

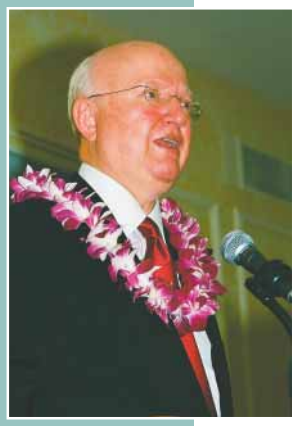
Another equally terrible policy objective is the attempt to federalize regional councils to reduce your relevance to that of subcommittee status. That is the recommendation that is coming from another group. Under that system, you would only provide input and recommendations to some new governance panel consisting of a new level of federal and state representatives. I shudder to imagine the trouble which we will encounter if decisions about when and where fishing should take place are brought back to Washington, D.C. The mechanism we have now works! And as Bill says when it comes right down to it, the final decision on an appeal is made here. But it is made after a process of listening to scientists and listening to people who know the area, know the requirements of the area, and know the sustainability of the area make those decisions. At times things need to come back to the desk here. Senator Magnuson and I intended that. And I do believe that this is a check — a national policy check on the direction that might be taken by a Council. But

it is only an exception that this would happen. The proposal that is before us now would be the rule. Every single action by a regional council would come to a governance board in Washington, D.C. I think my old friend Maggy would turn over in his grave like he was on a spit. There is just no way to comprehend that this would take place to emasculate the Magnuson-Stevens Act.

I recommend your regional councils focus on using sound science, protecting habitat, reducing bycatch, protecting non-fisheries resources including marine mammals, and always follow responsible and sustainable fishing practices. That is what it is all about. Not about those of us here in the room. But those in the future who will need this protein based resource. And it must be sustained. Regional Councils should determine your relevance in ocean policy and marine resource management. By that I mean you make sure we in Congress can defend the work you do and argue for your continued management of our nation's fisheries resources by adhering to goals of the Magnuson-Stevens Act.

"I recommend your regional councils focus on using sound science, protecting habitat, reducing bycatch, protecting non-fisheries resources including marine mammals, and always follow responsible and sustainable fishing practices."

Lastly, as one of my friends used to say: "If I had known I was going to live so long, I would have taken better care of myself." I am hopeful that we will start a national review of the Magnuson-Stevens Act. There are new problems to deal with. There are problems that we didn't even contemplate. There are problems of speed and accessibility of boats, accessibility of capacity. I think we should have hearings around the nation. I think we should listen not only to you on the councils, but to some of the people who want to criticize you. They criticize us; we will let them criticize you too, all right? Let's have a national debate. And let's look to extending this bill so that it lasts another twenty-five years. That should be our goal. Not to criticize it, but to improve it and to make it work even better.



Sam Bodman

Deputy Secretary of Commerce

As you heard from Senator Stevens, today we recognize a very important public-private partnership effort: the regional fisheries management process. Our regional system is built on a strong foundation of transparency, inclusiveness, and healthy, democratic debate.

I know that many of you are members of Regional Fishery Management Councils, and I want to start off by thanking you for your involvement and commitment. The Councils are critical to the successful management of our Nation's marine fisheries and ecosystems. The Magnuson-Stevens Act, which created the Councils in 1976, mandates that they be made up of knowledgeable representatives from various interested parties: commercial and recreational fishing industries, the conservation community, all states in the region, as well as the federal government. As many of you know, state representatives are nominated by the Governors and selected by the Secretary of Commerce.

This process, along with the inclusion of non-voting members from the U.S. Fish and Wildlife Service, the Coast Guard, the Interstate Marine Fisheries Commission and the Department of State ensure that we get what we need: a broad-range views and ideas.

The fact is, we need and value your input at the Commerce Department to make informed policy and programmatic decisions to carry out our mission. Now, many people think our mission at the Commerce Department is to count things — we count people, we count patents, we count goods and services produced by the U.S. economy — and, of course, we count fish!

But in all seriousness, our mission focuses on stewardship of our nation's free enterprise system. Our role is to create the right conditions for private industry to compete, innovate, grow, and create jobs. And economic stewardship necessarily includes stewardship of our nation's atmospheric and marine resources. The two are linked. It is clear that effective management of our fisheries resources helps sustain this country's economic vitality.

The U.S. economy relies on healthy, functioning marine ecosystems for food, for employment, for mitigation of floods and droughts, for recreation, travel and tourism, and on and on. Let me mention just a few of many examples:

- U.S. consumption of fishery products was 15.6 pounds (of edible meat) per person in 2002…up nearly a pound from the 2001 per capita consumption. Last year, U.S. consumers spent an estimated $55 billion for fishery products.
- By producing and marketing a variety of products for domestic and foreign markets, the commercial marine fishing industry contributed $28.4 billion (in value added) to the U.S. gross national product last year.
- Currently, about half of the U.S. population — 141 million people — reside within 50 miles of the coast, which constitutes only 11% of the land area of the lower 48 states. U.S. coastal counties are growing three times faster than counties elsewhere in the country. It is estimated that coastal and marine waters support *28 million jobs* in this country.
- A few state-specific examples: Hawaii's coral reefs generate $360 million a year for its economy in tourism and fishing activities. In 2000-2001, the reefs off of southeast Florida supported recreational diving, fishing and viewing activities

that generated over $4 billion in local sales, almost $2 billion in local income, and over 70,000 full and part-time jobs.

- There are other economic benefits as well, some of which are more difficult to quantify. We know, for example, that wetlands provide valuable habitat for primary food production, physical buffers against storm surges and coastal erosion, and a natural filtration system for chemicals and nutrients.

In my view, these few (of many) examples of economic impact reinforce why all of you are here this week. You are working together to educate the public and solicit input on the management of our nation's fisheries to ensure that they continue to contribute to economic growth and vitality in years to come.

This is important work. As you do it — as you consider ideas for improving our system — I thought it might be useful to mention some parallels between what you are engaged in here and another on-going initiative: global climate change research.

First, a bit of recent history. In February 2002, President Bush announced his comprehensive global climate change initiative — at NOAA headquarters in Silver Spring, in fact. Among other things, the initiative calls for investing in innovative clean energy technologies, challenging industry to reduce emissions, expanding international cooperation to complement our domestic programs, including in the area of global observation systems, and increasing funding for climate research.

Looking specifically at research, there is good news and bad news. The good news is that we spend about $2 billion on global climate research each year. The bad news is that those dollars are spread across 13 Federal agencies! So the President challenged us to build a focused science program to improve the information available to policy makers.

To do this, we needed a plan, so we developed one through months of hard work and an interagency team. Over the past year plus, 250 scientists — and these are career, government scientists — have been involved. The first major step was working through the interagency process to develop a draft plan, which was released for public comment last fall. The draft plan was reviewed by the National Academies of Science.

In addition, we held a workshop last December to gather input from the international science community. When we put out the announcement for the conference, we hoped to get a few hundred people to attend. We were wrong. Instead, over 1,300 scientists from around the world showed up, representing 47 states and 36 nations. All the feedback we received was reviewed and incorporated into the final plan, which was released a few months ago in July.

The result of this long process is a very high-quality, comprehensive, scientifically sound document that lays out in great detail a set of research goals and deliverables, in the form of 21 synthesis reports that will be created to inform policy responses to top-priority climate issues (over several years).

The planning process was difficult (downright grueling for some involved), intellectually rigorous, and inclusive. It was also just a start. Now we have to get down to work producing the many research products and reports. But we are at a point to ask: What can we take away from that process and apply to other policy challenges?

The policy similarities are considerable. Both climate change research and fisheries research and management have potentially considerable effects on our economy, our Nation's

industries, and our environment. They both involve a varied group of stakeholders. And they both present extremely complex public policy questions and challenges.

One lesson that can be drawn from the climate research planning process: close collaboration within the Federal government is essential. This is much easier said than done, of course. With climate change, we not only undertook to coordinate activities, but also dollars! We developed and submitted coordinated budget requests — a rare accomplishment in Washington, where agency turf is often defined by budget size.

"We will have differences of opinion to be sure — firmly held beliefs and very significant and emotional debates — but I also believe that we are united in our end-goal: to manage our fisheries resources to ensure their health, sustainability, and vitality for today and for the future."

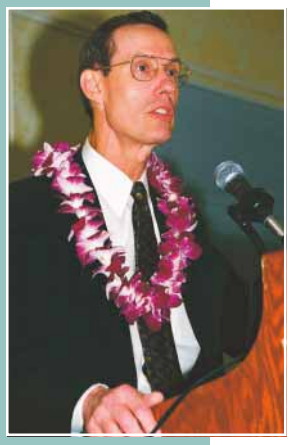
While fewer than 13 Federal agencies have a role in fisheries management (thankfully), the applicability of this idea is not lost on all of you, I'm sure. More coordination and communication can only improve the management of our fisheries. And these relationships need to work at all levels, from the Cabinet on down.

I know for a fact that you have leadership buy-in on fisheries management. Secretary Evans, myself, VADM Lautenbacher, Bill Hogarth and many others at NOAA are actively engaged on these issues. And, I was very pleased to learn that the Coast Guard — an agency with a key role to play here — has been so involved in this conference. I know Admiral Thomas Collins, Commandant, U.S. Coast Guard will be speaking at dinner this evening. We must continue to involve other agencies such as the Department of Interior, and Department of Agriculture. We also must continue to work constructively with leaders in the U.S. Congress, such as our good friend Senator Stevens.

Beyond inter-governmental collaboration, these efforts absolutely require the active participation of stakeholders outside of the federal government. Ideas for managing and protecting our environmental resources cannot be limited to Washington.

This event is a great example of the type of involvement we need. Participating as panelists at this conference are state government officials (from Massachusetts to Alaska), university researchers (from LSU, UMaryland, Duke, and others) experts from independent research and policy organizations, and representatives of industry and recreational and commercial fishing interests.

The bottom line, really, is that no one group can do this alone. We will have differences of opinion to be sure — firmly held beliefs and very significant and emotional debates — but I also believe that we are united in our end-goal: to manage our fisheries resources to ensure their health, sustainability, and vitality for today and for the future. I thank you for your commitment to that all-important objective, and for your participation in this conference.



Vice Admiral Conrad Lautenbacher

U.S. Navy (Retired)
Undersecretary of Commerce for Oceans and Atmosphere
NOAA Administrator

It is a great pleasure and privilege to be with you today and I thank NOAA Fisheries and the Regional Management Councils for inviting me to be a part of today's keynote address. This conference is the first of its kind to my knowledge. Never before have so many representatives of the Regional Fishery Management Councils, NOAA, recreational and commercial fishing interests, NGOs, academia, congressional members and staff, the public and media been brought together to enter into a serious dialogue about what we are doing to protect and manage our nation's living marine resources.

Over my first two years with NOAA, I have been striving to improve the way the agency operates and serves its constituents. In the last two years, NOAA has undergone a number of organizational and operational changes. Matrix management has been implemented to allow for improved communication and management within the agency in areas that require a multidisciplinary view by integrating talent, resources, and capacity across the NOAA line offices. A new planning, programming and budgeting system has been added that establishes a formal systematic structure for making decisions on policy, strategy, capability development, and resource allocation to accomplish NOAA's mission. We hope that this system will improve the ability of NOAA programs to gain public support. NOAA has also adopted a new strategic plan that lays out NOAA's focus through FY08, representing the vision of NOAA employees and our constituents.

Additionally, NOAA is working to foster new partnerships and to bridge the gap between constituents and traditional "beltway politics." Members of the NOAA Leadership team recognize the need for more communication with stakeholders and constituents, and as a result have conducted more outreach with fisheries constituents than ever in the past. I have held a number of constituent roundtables and meetings with diverse fisheries constituent groups. The head of NOAA Fisheries, Bill Hogarth, has also been extremely busy, conducting 17 constituent meetings throughout the country since May of this year. This was an unprecedented undertaking on Bill's part and I don't think fisheries constituents have ever had such access to the NOAA Assistant Administrator for Fisheries.

Better communication with constituents, honest dialog and transparency in the fisheries management process are essential pieces to the very complex puzzle of fisheries management. Also essential is understanding the complexity of marine ecosystems and how we impact our coastal and marine resources through various activities. Attempting to understand those things has historical roots back to the creation of the original national fisheries management organization. Seeking solutions to reverse the decline of New England's fisheries in 1871, Congress created the U.S. Commission of Fish and Fisheries. The first appointed Commissioner, Spencer Baird, initiated marine ecological studies as one of his first priorities. According to Baird, our understanding of fish "would not be complete without a thorough knowledge of their associates in the sea, especially of such as prey upon them or constitute their food." He understood that the presence or absence of fish was related not only to fishing pressures, but also to the dynamics of physical and chemical oceanography. The U.S. Commission of Fish and Fisheries later became the National Marine Fisheries Service, and fisheries management has been continually evolving into the process we have today.

It's been over 25 years since Congress passed the Magnuson-Stevens Fishery Conservation and Management Act, one of several environmental laws that were passed in the 1970s. During that time the public focused its attention on the health and welfare of our nation's oceans. This unprecedented interest ushered in a suite of marine conservation laws that reshaped the way Americans viewed marine resources, our stewardship responsibilities, and the need to invest in marine science and management of ocean resources to redress excesses of the past and ensure a sustainable future. Developed in 1976, the Magnuson-Stevens Act provides for federal management of fisheries in the 200-mile U.S. Exclusive Economic Zone. It established authority with the Department of Commerce, through NOAA Fisheries and the eight Regional Fishery Management Councils, for management of U.S. fishing operations.

The fisheries management process established by the Magnuson-Stevens Act is a dynamic and successful management regime that has evolved to meet new challenges. The public-private partnership of the regional fisheries management process is both democratic and transparent, although not without contention and dissension at times.

"The fisheries management process established by the Magnuson-Stevens Act is a dynamic and successful management regime that has evolved to meet new challenges."

Evaluating the effectiveness of the nation's fisheries management process must be viewed as an evolutionary process that continues today. After more than 25 years, the collaborative stewardship between NOAA Fisheries, the regional councils, and our constituents has produced a world-class body of science and management strategies that are leading the way toward ecosystem management, international stewardship, and most importantly, the successful rebuilding and sustainable harvesting of our nation's fisheries.

Responding to the increasing challenges facing fisheries management, Congress overhauled the Magnuson-Stevens Act in 1996, through a re-authorization known as the Sustainable Fisheries Act or SFA. Nearly six years have passed since we began implementing the provisions of this act. Under the SFA, Congress provided fisheries managers with rigorous management standards to address human impacts on the environment and to enact more proactive management strategies. The SFA presented many new mandates with the fundamental goals of:

- Preventing overfishing,
- Rebuilding overfished stocks,
- Protecting essential fish habitat (EFH),
- Minimizing bycatch,
- Enhancing research, and
- Improving monitoring and compliance.

The SFA also called for greater consideration of fishing communities and safety at sea, the formation of constituent advisory panels, and analysis of fishing capacity. Additionally, Congress, through the SFA, charged the National Marine Fisheries Service with assessing the extent to which ecosystem principles are used in fisheries management and research, and to recommend how such principles can be implemented further to improve our Nation's management of living marine resources. An Ecosystem Principles Advisory Panel forged a consensus on how to expand the use of ecosystem principles in fishery management. They didn't come up with a magic formula, but did offer a practical combination of principles and actions that they believe will propel management onto ecologically sustainable pathways. However, we expect that ecosystem-based fishery management will contribute to the stability of employment and economic activity in the fishing industry and to the protection of marine biodiversity on which fisheries depend.

Recent Achievements

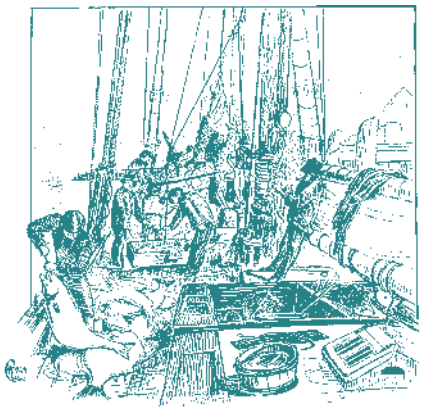
The SFA provided NOAA Fisheries with a number of necessary tools to meet the challenges of the new millennium as world-class leaders in fishery stewardship. The agency has placed a stronger emphasis on reducing bycatch, protecting marine habitats, halting overfishing, and rebuilding fish stocks to sustainable levels.We already have seen many fish stocks rebound as a direct result of the changes to the Magnuson-Stevens Act. However, the true magnitude of our achievements has yet to be realized, as these sweeping changes to the Act have been in place for a relatively short period of time. It will likely take many years before the results can be fully realized. In the meantime, NOAA Fisheries has made a number of important strides for which I would like to commend them.

Achievement: Status of the Stocks

Key to achieving sustainable fisheries is the need to rebuild depleted stocks. Though fish stocks will take many years to recover from overfishing practices of the past, the councils and NOAA Fisheries are well on the way toward meeting this challenge. In the last five years, we have reduced the number of stocks from both the overfished and overfishing categories, for a net gain of 13 stocks taken off the overfished list (20 removed, 7 added) and 14 off the overfishing list (26 removed, 12 added). In addition, 70 rebuilding programs have been developed and implemented for stocks that are overfished.

Rebuilding a depleted stock to a point where it can be fished sustainably is the desired outcome best or the environment and the economy. NOAA Fisheries and the Regional Fisheries Management Councils strongly believe we should do what we can to preserve fishing as an important part of local economies and the overall national economy. Fishing communities are an important part of the fabric of the American way of life.

In the few short years since implementing the SFA, we already have begun to witness the benefits of stewardship and sustainable harvests. For example, in 2002, commercial fishermen brought 908.1 million pounds of fish and shellfish to the port of Dutch Harbor-Unalaska, Alaska — an increase of 73.6 million pounds over 2001 landings — surpassing the 32-year volume record of 848.2 million pounds held by the port in Los Angeles, California. As the world's fifth largest fishing nation, our total commercial landings in 2002 totaled 9.4 billion pounds, worth $3.1 billion (exvessel).



Additionally, the recreational fishing industry in the United States makes an enormous contribution to the U.S. economy. Over 17 million Americans participated in recreational fishing in 2002, making over 65 million fishing trips and supporting almost 350,000 jobs with an economic impact of more than $30 billion. Healthy fish stocks are critical to maintaining this economic base.

Achievement: Habitat Restoration

Part of rebuilding stocks is not only to lessen fishing pressures on certain species, but to provide more habitat for fish for every stage in their lifespan. I am thrilled to be able to say that ESA-listed Pacific salmon stocks are more abundant, in some cases up to 800% over recent lows, due in part to investment in habitat restoration and conservation partnerships. In 2003, NOAA also initiated 200 new grass-roots fishery restoration projects that will restore 3000 acres of habitat through dedicated funding to national and regional partners. The science of restoration is still young, but something that deserves more of our resources.

Achievement: Better Data Collection and Research

Another critical area of study for NOAA Fisheries is to continue improving the quality and quantity of fisheries research data in order to better manage our living marine resources. I

am pleased to be able to say that NOAA is doing something about that in a big way. On October 17, we launched the first of four planned NOAA fisheries survey vessels to either augment or replace aging ships in the NOAA fleet. Christened the NOAA Ship *Oscar Dyson* by Mrs. Peggy Dyson-Malson, wife of the late Alaska fisheries industry leader for whom it is named, the ship will be one of the most technologically advanced fisheries survey vessels in the world. The same day we "cut steel" on the second fisheries survey vessel which will replace the NOAA Ship *Albatross IV* in New England, which is more than 40 years old. These ships will provide higher quality data to fisheries managers about targeted fish populations and the environment that sustains them.

Achievement: NEPA Compliance

In addition to collecting high quality data, NOAA is working very hard to make sure it has all its "I's dotted and T's crossed" when it comes to environmental regulations. We have been meeting with Fisheries Management Councils and NOAA NEPA coordinators to front-load the NEPA process into management plans and to reduce NEPA process-based litigation. Overall our compliance with NEPA has improved over the last few years. According to our new Fisheries Litigation Database, the number of new cases filed against NOAA Fisheries has fallen each year since 1999. Overall we are doing better in defending ourselves and we are winning more cases.

Achievement: Bycatch Reduction

Another central issue of concern for fisheries management is bycatch. It actually generates numerous lawsuits when the bycatch in question is an endangered or protected species! Over the past 27 years NOAA Fisheries and the management councils have responded to this concern by placing more effort into R&D on better models for monitoring and reducing bycatch, new gear technologies, and various management and regulatory measures to both monitor and reduce bycatch. In March 2003, NOAA Fisheries unveiled its strategy to further reduce bycatch and achieve the national goal of minimizing bycatch and the mortality of bycatch to the extent practicable through regional approaches and implementation plans. The strategy also includes an initiative to develop new international approaches to reducing bycatch on a global scale.

Achievement: Capacity Reduction

Reducing bycatch is a successful fisheries management effort NOAA has employed. Another successful management tool is to reduce overcapacity, that is to reduce the level of fishing effort within a fishery. At the end of October, 86% of participants in the West Coast groundfishery voted for a buyback within the industry. Ninety-two boats or 35% of the boats in the fishery will be taken out of service. The buyback program was created by fishermen and approved by Congress, which appropriated $10 million and $36 million in loans to buy the boats and permits of West Coast fishermen.The loans will be paid back based on landings by the reduced fleet. In New England we went through a similar exercise in 2002 where we purchased groundfish 245 limited access permits (21,500 groundfish days at sea are permanently removed) with $10 million appropriated.

Achievement: Cooperative Research Programs with the Fishing Industry

Just as we have worked cooperatively with the fishing industry to reduce bycatch and remove overcapacity from certain fisheries, NOAA Fisheries and the regional management councils are working cooperatively with advisory groups comprised of fishermen, academia, scientists and members of the environmental community to improve integration of management efforts and research initiatives and to increase information available for decision making. In several regions, funds have been made available to support research projects that address gear issues, bycatch reduction strategies, habitat characterization, and electronic data collection methods.

Challenges for the Future

I am extremely pleased with the gains that NOAA has made in the area of fisheries management over the past few years. However, despite all these gains, there are also a number of challenges that we are looking towards as an agency.

Challenge: U.S. Commission on Ocean Policy

The U.S. Commission for Ocean Policy will be releasing a report later this year that is expected to make a number of far reaching recommendations on how to improve management of our oceans and marine resources. Those recommendations will be carefully evaluated by NOAA when the report issued. Our NOAA Ocean Council, chaired by Rick Spinrad, is poised to respond to the recommendations from the report.

"By aligning the organization, mission and research agenda of NOAA in a way that looks at the whole Earth system, we are poised to fully understand and implement ecosystem-based management of our marine and coastal resources, such that we can manage our coastal and marine resources in a responsible, sustainable manner for generations to come."

Challenge: The Need for Better International Fisheries Management

Despite the fact that domestic fisheries and their management seem to have turned a corner in the past several years, I do not believe that the same could be said for international fisheries, many of which appear to be in fairly serious conditions. The United States has always been a world leader in the fisheries management, and we plan to continue this trend. We are working hard with our constituents to not only export our policies and management tools, but also fishing technologies with reduced impacts on targeted and non-targeted resources. Later this afternoon, Bill Hogarth is leaving for Ireland where he will head up the U.S. delegation at ICCAT — the International Commission for the Conservation of Atlantic Tunas. We have a long way to go to achieve sustainable management of international resources, but working with partners like you, I am hopeful we can develop prudent policies and practices to manage those resources for people today and for future generations.

Challenge: Earth Observation System

Throughout my talk, you have heard me make a number of references to ecosystem management. NOAA takes our mission to, "Protect, restore, and manage the use of coastal and ocean resources through ecosystem-based management," very seriously. Within this context, NOAA is working with its partners to move toward a better scientific understanding of ocean ecosystems, as well as ways to manage living marine resources on an ecosystem basis. The degree to which we will be successful in rebuilding fisheries and recovering protected species through this type of management will depend not only on how well NOAA does its job, but on how well we work with our partners — everyone in the audience today — to achieve those goals.

I mentioned before that we are changing the way we are doing business and we are trying to be more responsive to our constituent-base. NOAA has also embarked upon an exciting new initiative aimed at understanding the Earth and its complex systems. I strongly believe we have reached a time for an Earth Science Renaissance — a new era where human ingenuity must be applied to develop a deeper understanding of the complex systems of Planet Earth. To that end, NOAA is committed to the development of a comprehensive, integrated and sustained Earth observing system that will link thousands of individual technological assets, including space-borne, airborne and *in situ* observation systems around the world. The information obtained from an Earth observing system, particularly the ocean observing portion of it, will be of great value to fisheries managers. By better understanding the physical, chemical, and biological components of our oceans, and how those factors interact, I expect that we will greatly improve our understanding of ocean and coastal ecosystems, as well as the impact of humans on those systems.

Given the difficult social and economic issues facing the world, the time has come to move beyond considering the separate disciplines of science as "stand alone" components of the big picture of life on Earth toward a broader ecosystem-level approach. We need to ask how the parts fit together and function as a whole. By aligning the organization, mission and research agenda of NOAA in a way that looks at the whole Earth system, we are poised to fully understand and implement ecosystem-based management of our marine and coastal resources, such that we can manage our coastal and marine resources in a responsible, sustainable manner for generations to come. Sustainable management of our fisheries resources is also the goal NOAA Fisheries as well as the Magnuson-Stevens Act.

"Together, the Regional Fishery Management Councils and NOAA Fisheries continue managing our ocean resources for the maximum benefit to the nation, ensuring long-term recreational fishing opportunities for the American public, supporting coastal communities and fishing families, and maintaining a sustainable seafood supply."

Challenge: Magnuson-Stevens Reauthorization

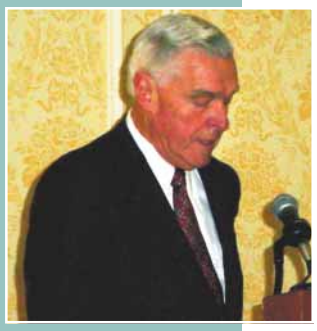
As you all know, the Magnuson-Stevens Act is currently up for reauthorization. As a result, the act is once again under public review to examine its effectiveness, revisit its goals, and determine what changes are necessary to build on current achievements and meet future challenges. In response, NOAA transmitted an Administration Magnuson-Steven reauthorization bill to Congress in June 2003. The NOAA recommendations for reauthorization are the result of six years of council and agency regulatory experience under the Sustainable Fisheries Act amendments to the Magnuson-Stevens Act. These recommendations include:

- Making the fisheries management more efficient by streamlining the comment, review and approval process for fishery management plans;
- Developing standards for Individual Fishing Quotas;
- Improving the effectiveness of fishing capacity reduction programs;
- Imposing tougher fines and penalties for fishery violations;
- Funding alternatives for fishery observer programs;
- Removing restrictions on access to essential economic data; and
- Providing a statutory distinction between the terms overfishing and overfished.

The fisheries management process has undergone dramatic change since the 1970s, when eliminating foreign fishing and developing domestic fisheries were the primary objectives. Today, the regional management framework has become a leading forum for advancing science-based management of living marine resources. Together, the Regional Fishery Management Councils and NOAA Fisheries continue managing our ocean resources for the maximum benefit to the nation, ensuring long-term recreational fishing opportunities for the American public, supporting coastal communities and fishing families, and maintaining a sustainable seafood supply.

I wholeheartedly agree with a statement Bill Hogarth made recently, "Our fisheries management system is one of the most successful in the world, and with refinement, we can look forward to an even better system." Hopefully the reauthorization of the Magnuson-Stevens Act will provide that needed refinement.

With that I will close my remarks and invite you to enjoy the rest of your time here. I have looked at the agenda and it is ambitious, but should provide a great venue for meaningful dialogue and hopefully the generation of new ideas on how to solve these complicated problems.



Admiral James D. Watkins

U.S. Navy (Retired)
Chairman, U.S. Commission on Ocean Policy

It is my pleasure to be here with representatives of the eight Regional Fishery Management Councils, the National Marine Fisheries Service, commercial fishermen, sports fishermen and others. I understand that the North Pacific Fishery Management Council deserves a special "thank you" for coordinating this first-ever conference and creating the opportunity for the managers of this nation's fisheries to work together to identify issues and recommendations for future management improvements.

Today, I welcome the opportunity to share with you some of what we have already accomplished at the U.S. Commission on Ocean Policy — and some of what we hope to accomplish in the near future. Before I do that though, I want to acknowledge three fellow commissioners – all of them participating in this conference and each knowing a lot more about fisheries than I do. While I expect they will be more specific on fisheries issues than I will be today, my job will be to provide an overarching view of Commission recommendations. My fellow Commissioners are: Dr. Paul Sandifer of South Carolina, whom you heard from yesterday regarding fishery governance issues; Dr. Andy Rosenberg of New Hampshire, who will be on the Ecosystem Panel today; and Mr. Edward Rasmuson of Alaska, who will participate in the wrap-up panel tomorrow.

While I'm on the topic of the great State of Alaska, I also want to acknowledge U.S. Senator Ted Stevens, who addressed your meeting yesterday, and who testified before our Commission last August in Anchorage. At that meeting, we heard excellent testimony from 27 invited panelists and public comment from 25 Alaskans from all walks of life. Everyone who spoke gave the Commission food for thought, including Senator Stevens who said, "We are a State related to everything you're doing." That statement is very true, and it is also something we heard echoed by commercial fishermen, recreational fishermen, industry, managers, government officials, businesses and stakeholders in South Carolina, Hawaii, California, Massachusetts, Florida, Washington State and countless other places along the way. We know fishery issues are important and often contentious, and we know that there are a lot of people out there interested in our work and recommendations. I want to emphasize that the concerns you have, and those concerns of everyone whose life or livelihood is touched by the oceans, deserving our careful attention.

As many of you know, we are still involved in our own internal deliberative phase and report writing. The Commission hopes to complete this phase later this year. At that point, a draft will go to the governors for comment and will be available on the Commission website for review by all stakeholders. After the governors and interested stakeholders have had time to review the draft report and comment, and we have had some time to reflect on their contributions, the final report will be submitted to the President and the Congress.

Our report is a "work in progress" and nothing I say today is cast in concrete until the Commission as a whole approves the final document. This has been a long and enlightening process, even longer and even more enlightening than we anticipated at the outset. With so many complex issues to investigate, with so many people to hear from, and with our determination that this report produces an action plan that can stand the test of time — I believe we have spent the additional time wisely. I hope you will agree when you see the report.

"As the global demand for fish increases, so does our responsibility to ensure the sustainability of our finite fishery resources."

Several times in the last year I have been asked about the anticipated receptivity of the Administration and Congress to the report. That remains an important question. At this point, we are working on the assumption that the President and the Congress are serious about the need for establishing and implementing a national ocean policy that realizes the objectives laid out in *Oceans Act 2000*, our enabling legislation. Early indications support this assumption.

I also want to stress that all 16 Commissioners are united in writing the most comprehensive and compelling report possible, one that is taken seriously by the White House, Congress and the broad community of ocean and coastal stakeholders and which includes recommendations that Congress and the White House will want to implement.

Before we get into more specific issues, I think it's important that you all have the context for our work. When the Commission launched this worthwhile endeavor, the President and Congress charged us with fulfilling eight objectives, which were laid out in *Oceans Act 2000*. We are also mandated by the law to give equal consideration to environmental, technical feasibility, economic, and scientific factors. In other words, this has to be a balanced report that examines not only the full suite of activities, laws and regulations having an impact on coastal and ocean management, but also develops recommendations that recognize the interdependence of, and interplay among, ecological, social, and economic factors.

A lot has changed in this country since the Stratton Report was published 34 years ago. Our coastal zones have become incredibly dense with population and commerce, the country has become more and more dependent on marine transportation, and coastal tourism has become one of the top economic drivers of our national economy. The testimony given before the Commission clearly indicates that the nation's ability to manage the oceans and coasts — the life that dwells there, the commerce that thrives there — is not keeping pace with the pressures society is placing on them.

In our meetings across the country, we heard testimony about failures in fisheries management, habitat protection, and environmental protection. We heard about the decimation of the once-legendary Pacific salmon and steelhead runs; and the loss of millions of acres of wetlands in the Gulf of Mexico. Clearly, we are experiencing the loss of ecological resiliency in rivers, bays and lakes due to the cumulative impacts of pollution and development. All of these setbacks add up to a threat to our living marine resources and to the lives and livelihoods of the people who depend on the nation's fisheries.

When we started our fact-finding phase last year, I think it's fair to say we assumed fisheries were in a bad way. Now, as we near the end of our investigation and deliberation, it's clear that although *some* of our initial perceptions proved accurate, in many ways fisheries management councils are going to be far ahead of other groups in aligning with the Commission's principles and recommendations which are not final, but I am convinced are headed in a constructive direction. In this regard, details surrounding each of the following points are outlined on our website in draft policy options documents and in transcripts from the public meetings:

- First, we would like to see a broadening of the representation on the councils.
- The Commission wants to underscore the importance of requiring high-caliber science and statistical committees.
- We will most likely mandate greater adherence to scientific guidance in the management decision-making process — i.e., separating science and management.
- We will support cooperative fisheries research.

- We will most likely support giving Councils the use of a wider variety of management tools such as individual fishing quotas (IFQs). This is both a conservation and a safety measure since quota-based management can help end the "race for fish."

The Commission also recognizes that there are international issues to be dealt with and we will make recommendations urging the U.S. to lead the way in promoting better fishing practices worldwide by ratifying the U.N. Convention on the Law of the Sea. As a signatory to the LOS, the U.S. is better positioned to negotiate and enforce existing fishery management agreements on the high seas. Canada signed on to the treaty last week and it's high time we do also.

Now, based on what I have just shared with you, you can see that the Commission is beginning to close on our recommendations for improved fishery management in this country. Our challenge now is to make these recommendations blend with and compliment the broader context of a coordinated and comprehensive national ocean policy, which I will touch on next.

The Commission believes that ocean policies will be ineffective unless they take into consideration the interconnections among every activity and every part of the system they are attempting to manage. Those who work in the area of fisheries may well have a better grasp on this than others. You are already working within a regional management structure — giving you an excellent grasp on the relationships and complexities among all the pieces that must work together as a whole.

"We believe that ecosystem-based management will lead to better decisions that protect the environment while balancing multiple uses of ocean areas."

To address this important issue nationwide the Commission will emphasize that the policies governing the use of U.S. ocean and coastal resources should be ecosystem-based, science-based, and adaptive. This stance reflects the latest scientific understanding about the world, and we will advocate that ecosystem-based management should be at the heart of any new ocean policy framework.

Some of you may be asking yourselves, what do they mean by ecosystem-based management? The Ocean Commission has grappled with the best way to articulate this principle, and after much debate we have tentatively agreed to define it this way:

> " U.S. ocean and coastal resources should be managed to reflect the relationships among all ecosystem components, including humans and non-human species and the environments in which they live. Application of ecosystem-based management will require defining geographic management areas based on ecosystem, rather than political, boundaries."

We believe that ecosystem-based management will lead to better decisions that protect the environment while balancing multiple uses of ocean areas. Managers will need to work with the scientific community to develop the information and understanding needed to support such complex decisions. But the critical process of setting goals to guide management will require active participation by many different stakeholders with divergent views. This will be difficult to achieve without changes to the existing governance system.

So, what does this means for fishery management councils?

For ecosystem-based management to succeed, we need new information resources, large-scale data-management systems, and fundamental changes in research and management approaches. This is a very different approach from single-species or single-issue management, and some fishery management councils are poised to lead the way. In particular, the North Pacific Fishery Management Council, recognized as one of the most effective in the nation, has changed the management regime in promising directions by:

- Including a strong presence from the fishing industry;
- Monitoring catches with a computerized catch accounting system to maximize harvest efficiency while reducing bycatch;
- Listening to the science; and by
- Using fishermen to help maintain industry support for the management measures needed to maintain the largest and most valuable fishery in the world.

"For ecosystem-based management to succeed, we need new information resources, large-scale data-management systems, and fundamental changes in research and management approaches."

Ecosystem-based management is also a good starting point for a better understanding of the human dimension of fishery management. It will ensure that all of the factors are weighed, whether managers are considering relaxing catch limits or hammering them down. It will provide the proper forum to consider how those decisions impact the fishing community and balance economics with the environment. For example, this country's "move to the coast" means that property values are skyrocketing in every coastal area, including those cities that have supported traditional fishing communities for generations, such as Gloucester, Portland, Charleston and Seattle. We can all agree that a booming economy is a good thing, but we don't want to see fishing communities squeezed out in the process.

I would simply point out that one of the congressionally-established policies that States are to pursue in their Coastal Zone Management programs is to give priority to ocean-dependent uses for the siting along the coast of major facilities related to, among other things, fisheries development. Maybe we all need to be reminded of that national policy from time to time and maybe the U.S. Ocean Commission can help in this regard.

There is another aspect to the human dimension as well — deciding where we want to be on the continuum between *only* considering the health of the fish stocks versus *only* considering the health of fishermen and fishing communities. In the past, it has been an all or nothing question with too many Councils deciding against the health of the fish stocks. However, ecosystem-based management can provide a mechanism to ensure that the pendulum does not swing too far, with abundant stocks of fish and no one left to catch them. Does the Commission think that moving toward ecosystem-based management will be easy? No! Fishery management will continue to be difficult, but it does provide some hope for improving the process.

The next area of focus is the Commission's strong sense that this country needs a new Ocean Policy Framework. This Framework is the key for implementing the comprehensive national ocean policy and our recommendations in this area will be the underpinning for many of the other recommendations in the report. As proposed, the Framework includes the following phased approach to foster better coordination. We will propose that Congress and the President:

- Create a new National Ocean Council at the Federal level (in the Executive Office of the President);
- Appoint an Assistant to the President who would chair the council and head up a small Office of Ocean Policy; and
- Appoint a non-Federal Presidential Council of Advisors on Ocean Policy.

Why a Framework?

One of the clearest and most important messages we heard from managers and other experts was that they are inundated with laws, policies and regulations governing our use, protection and management of marine resources, some at cross-purposes with each other. Conspicuous by its absence is a mechanism to coordinate these disparate governance tools to bring ocean resource management within an integrated structure. This disjointed approach has led to confusion and contradiction. Several of the laws that currently govern

the management of living marine resources — the MMPA, ESA, MSA and NEPA — were developed with specific resources management objectives and include explicit procedural requirements. Unfortunately, their objectives can conflict and the procedural requirements are not aligned, resulting in confused priorities and unwieldy timeframes that leave final decisions vulnerable to litigation.

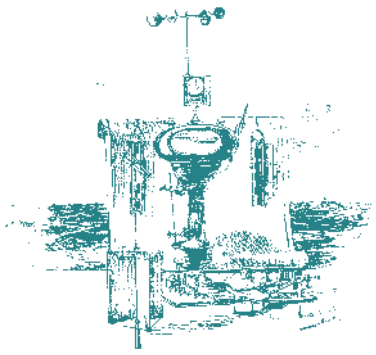
What does the Framework mean for fishery councils?

On the federal level, the Framework should provide Councils a strong mechanism for dealing with issues that fall outside the purview of the Magnuson-Stevens Act, such as the impact on fisheries from pollution, coastal development, and habitat destruction.

In addition to this national level approach, there is a need for better planning and coordination at regional, state and local levels. Many of the pressing issues of today are regional in scale, and today's "top down" governance system is not designed to successfully transcend jurisdictional lines. The creation of regional ocean councils, non-regulatory in nature and representative of state and local policymakers and other stakeholders, is a potential "bottom up" mechanism under consideration. These councils — which would not in any way duplicate or adversely affect your fishery councils — could identify and address ocean and coastal issues at the regional level and provide input to the Federal leadership via the new framework we have designed. This concept is particularly intriguing since regional approaches to ocean issues are better suited to implementation of the ecosystem-based management approach.

The bottom line here is that the Commission's Framework proposal does *not* mean that we want to abolish the regional fish council system — we think it's a good one. Rather, we want to expand the regional coordination concept to address other ocean and coastal issues.

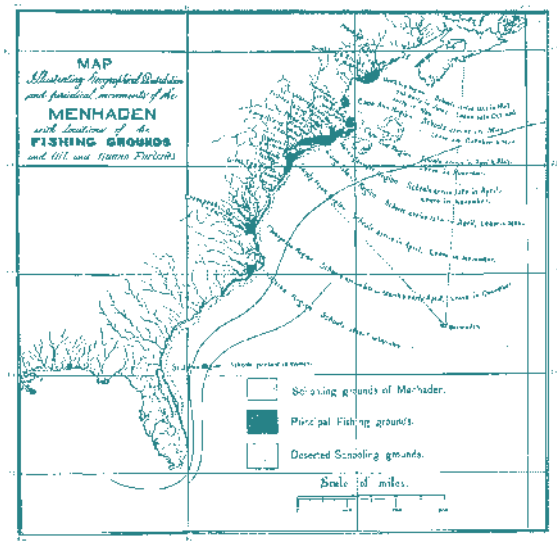
One other area I want to touch on briefly is the need for an Integrated Ocean Observing System — also known as IOOS — which became clear early in our process. The Commission believes that this nation will not be able to make sound, science-based management decisions without correctly attributing cause and effect. This new level of understanding cannot be achieved without an integrated ocean observing system that is sustained over time and designed to produce meaningful predictions. The Commission will make strong recommendations supporting the national IOOS, currently being developed under the auspices of the National Ocean Research Leadership Council in concert with non-Federal research scientists and resource managers.



Further, Commission deliberations revealed a subtle bias in the early discussions of IOOS toward traditional chemical and physical oceanography, and against biological measurements. The Commission will recommend that IOOS be designed in cooperation with the users whose valuable insights will be critical to designing a system that provides information and products that are useful to them.

Perhaps the most pressing challenge facing us all is whether there is a strong will, and strong sense of urgency, in Congress, the White House and among the ocean community and the general public to accept, support, implement and sustain the actions and policies needed to resolve the issues we face and to grasp new opportunities as they arise. The Commissioners think so. But, to succeed, we're going to need a "full court press" from all ocean stakeholders. We are counting on that. It will require a concerted and united clarion call from the public and the ocean community. The constituencies you represent are powerful and highly respected on Capitol Hill. When you speak, people listen. Thus, I challenge you to meet this call, to put aside any differences and self-serving perspectives for the common good.

When our report comes out, you may not agree with all of our recommendations, and you may think that some particular area did not receive adequate treatment. That is understandable and inevitable, but it should not prevent you from supporting the creation of a comprehensive and coordinated national ocean policy. There has been a tremendous national focus on marine issues over the past two to three years and we must not lose that momentum. This is the first golden opportunity we have had since the Stratton report of 34 years ago to really focus national attention on the myriad ocean and coastal issues facing us and to implement a national ocean policy that protects and sustains our coastal and ocean resources and environment for the societal and economic benefit of all. But we are going to need the help of everyone in this room — through your local county, state, and federal agency representatives, the Congress, and the business and industrial communities to encourage their follow-through and persuasive involvement in the implementation process. This may be the only realistic chance we'll have again for many years.



Admiral Thomas H. Collins

Commandant, U.S. Coast Guard

I am honored to be here with you celebrating over 25 years of the landmark Magnuson-Stevens Fisheries Conservation and Management Act. I appreciate the opportunity to speak with you about the Coast Guard's role in domestic and international fisheries management.

Before I discuss the Coast Guard's role in fisheries management, let me first congratulate NOAA Fisheries and the eight Regional Fishery Management Councils for the outstanding work they have done improving the size and sustainability of U.S. fish stocks. The number of stocks with sustainable harvest rates rose by 45 percent between 1999 and 2001. Many fish species — like Georges Bank haddock and yellowtail flounder — that were heavily over-harvested a few years ago, today are either healthy or headed toward recovery through their efforts. In the South Atlantic, the king and Spanish mackerel stocks have been successfully rebuilt, as have the scallop stocks off New England. NOAA Fisheries recently reported Pacific halibut bycatch has been reduced by more than 30% as a result of management efforts. Elsewhere, summer flounder is now doing so well that regulations were relaxed to allow fishers to harvest 36% more while the stock continues to rebuild. These are remarkable success stories and they couldn't be more timely.

As the global demand for fish increases, so does our responsibility to ensure the sustainability of our finite fishery resources. The seas and the resources they possess are the world's "Village Commons" of the twenty-first century. Today we see many significant threats to their sustainability, including under-reporting catch,using illegal harvesting methods, and unlawful encroachment into foreign Exclusive Economic Zones, or EEZs.

Since the Coast Guard's creation in 1790, one of our most important jobs has been to enforce the laws and regulations that prohibit these practices. To accomplish that, we have solidified robust relationships with fisheries managers here at home and internationally. Our common task has never been greater than it is today. More than 11% of our operating budget is spent on fisheries law enforcement.We are in the process of revalidating our fisheries law enforcement strategic plan. This revalidation process helps ensure close alignment with the fishing industry and other concerned entities such as the seafood industry, other government agencies at the federal, state, and local levels, our enforcement partners, and the Regional Fishery Management Councils. As part of our revalidation process, we've held nine public listening sessions and received constructive feedback from some 200 constituents.

I believe there are four essential cornerstones to ensuring the sustainability of our fishery resources well into the future:

- Strong regulatory schemes;
- Enforcement presence;
- Investment in technology; and
- Effective partnerships.

As with any good foundation, these cornerstones do not stand alone — they are not mutually exclusive. They are linked with strong mortar, and together, they strengthen each other.

Strong Regulatory Schemes

Strong regulatory schemes begin at home. In 1976, the Magnuson-Stevens Act did just that. The MSA set the standard in domestic legislation to manage fisheries. It has grown and matured since that time and remains one of the benchmark pieces of U.S. legislation. The MSA created the eight Regional Fishery Management Councils, and their superb efforts have improved U.S. fish stocks and safeguarded those fish stocks' long-term sustainability. Once-decimated stocks have rebounded, and fishing grounds once thought barren have been replenished.

"If a regulation cannot be enforced, it will be of minimal value to protecting our resources."

But success is sometimes its own worst enemy. With such improvements in our domestic fisheries, the incentive for irresponsible fishing by a few bad actors increases. Additionally, as the rest of the world's fisheries decline, the rich U.S. EEZ becomes a more enticing target for foreign fishers. To combat this increased threat to our fisheries, we need regulatory regimes that are enforceable and have teeth. If a regulation cannot be enforced, it will be of minimal value to protecting our resources. Likewise, if it lacks significant penalty, there will be little or no incentive to comply. Fines and/or other penalties will simply be written off as the cost of doing business. We have seen this, especially in cases involving large foreign fishing vessels.

Enforcement Presence

In order to enforce those strong regulatory schemes, we must have an enforcement presence. That does not necessarily mean crowding the oceans and skies with enforcement ships and planes. Presence can come in the form of unmanned aerial vehicles, vessel monitoring systems, and cued intelligence, among other things. Of course, the deterrence value of having a Coast Guard cutter or aircraft present and visible cannot be overstated.

In today's resource-constrained environment, however, we have learned to work smarter, not harder. As you are all aware, the Coast Guard is a multi-mission service and our mission portfolio has undergone a tremendous shift since September 11, 2001. As a result, we are relying more than ever on the last two cornerstones — technology and partnerships — to help us maintain our enforcement presence on the fishing grounds. And I'm happy to report, it's working. Our performance measure for domestic fisheries is a 97% compliance rate. Our enforcement efforts are having the impact we want if only 3% or less of the fishers are committing "significant violations," meaning violations that give a fisher a significant monetary advantage, have a significant impact on the fish stock, or violations that are of a particularly sensitive nature. With an observed 97.1% compliance rate, I'm confident that our efforts are well placed.

Investment in Technology

As I said, the deterrent value of having a Coast Guard cutter or aircraft present and visible cannot be overstated, but with 3.4 million miles of EEZ to patrol, plus certain high threat areas on the high seas, we cannot be everywhere at once. One answer to this is the effective leveraging of existing technology and investment in future technologies.

The Management Councils continue to implement compulsory carriage of Vessel Monitoring Systems, or VMS, in their fishery management plans. This is a boon for the Coast Guard as it significantly improves our ability to efficiently manage our resources. Through the use of VMS data we can effectively monitor the comings and goings in *dozens* of regulated areas from one site and then to respond to confirmed incursions. This certainly is a much better use of our resources than having a cutter out patrolling in one area while an incursion is happening in a completely different location.

We are currently working with NOAA Fisheries to access their National VMS. We estimate it will be on line this summer and provide all of our Command Centers with continuous live feed data. We anticipate that same live-feed data to be exported to our major cutters by the end of 2004. VMS is *key* to the future of fisheries enforcement and it is paying dividends already. There have been a number of enforcement cases decided solely on VMS data, proving the validity of the system, its usefulness as an enforcement tool, and a way to increase presence through technology.

Our Deepwater program is well underway. We anticipate cutting steel on our first National Security Cutter in 2004. This class of cutter will have the range and endurance to effectively enforce both domestic and international fisheries regulations hundreds of miles out to sea. Also planned as a part of the Integrated Deepwater System are unmanned aerial vehicles or UAVs. UAVs can be launched from either a land-based or sea-based site and provide aerial surveillance without the need of a complete flight crew. For fisheries cases, the UAV can either alert a nearby cutter of suspected illegal operations or simply document suspected illegal activity to be used later in a prosecution, similar to what is now down in some VMS cases.

Effective Partnerships

Yet another means of leveraging constrained resources is with effective partnerships. The Coast Guard enjoys many partnerships: domestic and international, formal and informal.

To bolster the enforcement presence in the U.S. EEZ, Coast Guard units routinely participate in joint operations with state and local enforcement partners. Many of these joint operations are carried out under the auspices of NOAA's Joint Enforcement Agreements and many are done ad hoc, based on close working relationships cultivated at the local unit level.

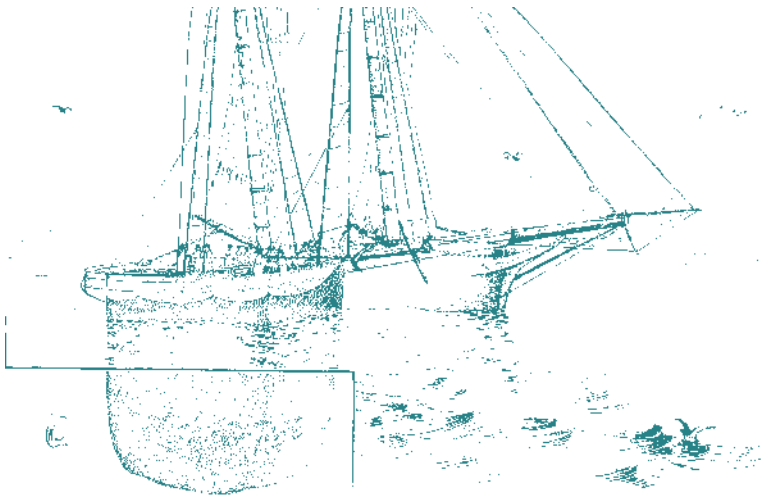
We assist NOAA Fisheries in enforcement operations as well. It is not uncommon for a NOAA Fisheries agent to be deployed on one of our cutters or to fly in one of our enforcement aircraft on fisheries patrol. In certain regions we assist NOAA Fisheries with inspections of shoreside facilities.

In the international realm we currently have fisheries enforcement agreements with Canada, the People's Republic of China, and Taiwan. We are in the process of concluding one with the Russian Federation and we are working on one with Mexico. We collaborated with Russia on a Joint Operations Manual, addressing law enforcement operations in the Bering Sea and have had successful joint operations with their vessels, due in part to the Manual.

The United States is also a member of many formal Regional Fishery Management Organizations. Through these organizations we partner with other nations to oversee stewardship of our marine resources. The Coast Guard plays a key role as a member of U.S. delegations to these organizations.

Partnerships are not just limited to policy-making or direct enforcement operations. Training plays a vital role in effective management and enforcement. The Coast Guard has five regional fisheries training centers. We routinely host students from local, state, and other federal agencies in our two-week fisheries courses. We have also hosted Russian, Irish, and Mexican students as well. Through our International Maritime Officers Courses, our deployable International Training Teams, and our specialized workshops, we routinely work with countries around the world to assist them in developing their own fisheries management, enforcement, and stewardship programs to help them better manage and enforce their own regulatory schemes.

In closing, I want to reiterate the importance of the job that you, our fisheries managers, do. I know that it may sometimes be frustrating and extremely complex work, but the payoff is immeasurable: sustainable fisheries resources for our future generations. To achieve that common goal, the Coast Guard is here to partner with you to develop safe and enforceable management plans and then to enforce those plans through presence, technology, and partnerships now and well into the future.



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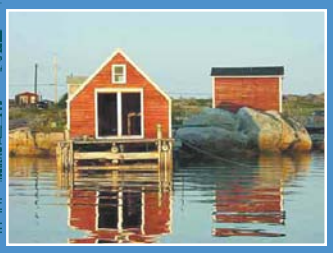

Section II.

Regional Council Presentations

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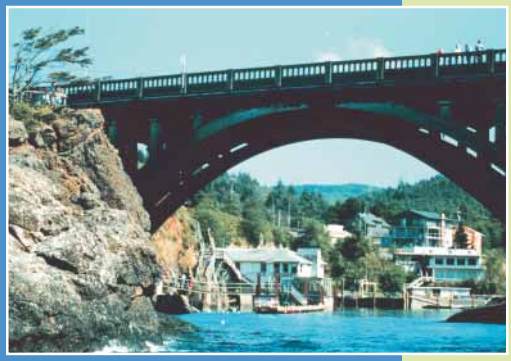


1. New England
Fishery Management Council

50 Water Street, Mill 2 ◗ Newburyport, Massachusetts 01950 ◗ Phone: (978) 465-0492 ◗ www.nefmc.org

Note: *This paper was presented at the Conference by Paul Howard, Executive Director.*

The New England Council, one of eight regional councils established by federal legislation in 1976, is charged with conserving and managing fishery resources from three to 200 miles off the coasts of Maine, New Hampshire, Massachusetts, Rhode Island and Connecticut. The management authority of the Council extends to the Gulf of Maine, Georges Bank, and southern New England, and overlaps with the Mid-Atlantic Council for some species in that region. Presently the Council has nine fishery management plans (FMPs) in effect: Northeast Multispecies (Groundfish), Scallop, Monkfish, Herring, Small Mesh Multispecies (whiting and two stocks of hake), Red Crab, and Northeast Skate Complex, as well as two additional plans that are prepared jointly with the Mid-Atlantic Council, Monkfish and Spiny Dogfish.

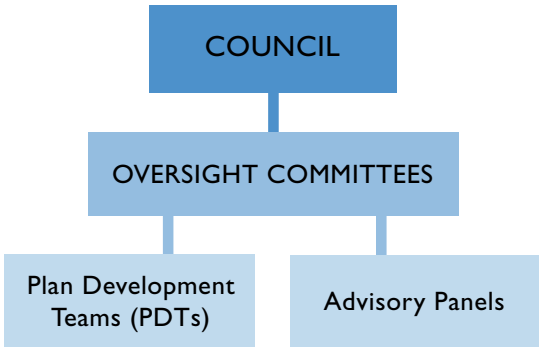
The twenty-two member Council is made up of both federal and state officials as well as members who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest of the fishery resources in the New England region. These include the Regional Administrator of the National Marine Fisheries Service (NMFS), the principal state officials with marine fishery management responsibility for Maine, New Hampshire, Massachusetts, Rhode Island and Connecticut and twelve members nominated by the governors of the New England coastal states and appointed by the Secretary of Commerce for three-year terms. In addition, four non-voting members represent the United States Coast Guard, the U.S. Fish and Wildlife Service, U.S. Department of State, and the Atlantic States Marine Fisheries Commission.

(Photos above, left to right)
New England boat harbor.
MIT Sea Grant, Center for Marine Sciences

Charter vesssel mate, Rhode Island.
Kirk Gillis, NOAA Fisheries

Portland Marine Trade Center.
Wm. B. Folsom, NOAA Fisheries

Sponge habitat.
Observing fish reaction to gear using underwater video.
NOAA Fisheries



The Council meets approximately seven times a year. To more efficiently develop alternatives and management measures for Council consideration and eventual inclusion in a fishery management plan, each Council member serves on one or more oversight committees that meet independently throughout the year. Committees generally are related to a specific fishery or management issue.

Oversight Committees meet regularly to review and discuss individual fishery management plans and develop specific measures that will form the basis of the plan, plan amendment or framework adjustment to an FMP. Oversight committee recommendations are forwarded to the full Council for their approval before inclusion in any draft or final version of an FMP.

Advisory Panels are made up of members from the fishing industry (from both commercial and recreational sectors), scientists, environmental advocates, and others with knowledge and experience related to fisheries issues. They meet separately or jointly with the relevant oversight committee and provide input and assistance in developing management plan measures. Advisors are appointed every three years following a solicitation for candidates. After reviewing applications, the respective committee chairman selects new or returning advisors. The Council's Executive Committee provides the final approval of advisory panel members.

Plan Development Teams (PDTs) are made up of scientists, managers and other experts with knowledge and experience related to the biology and/or management of a particular species. Individuals serve as an extension of the Council staff. PDTs meet regularly to respond to any direction provided by the oversight committee or Council, to provide analysis of species-related information and to develop issue papers, alternatives, and other documents as appropriate. A member of the Council staff generally chairs each PDT and the team members are from state, federal, academic or other institutions.

The Council utilizes the recommendations of its committees, the advice of its advisory panels and the analyses provided by the PDTs, as well as the testimony of affected stakeholders and the public in considering proposed management actions. It is this cooperation, as well as partnerships with other agencies and organizations, coupled with a transparent process that forms the basis of the Council system.

Rebuilding New England's Fisheries

In discussing fisheries management in New England, I will focus on what I consider the four primary tenets of sustainable fisheries and how they relate to our management plans in New England: Ending overfishing, is first and foremost, followed by eliminating excess capacity, protecting essential fish habitat (EFH) and minimizing bycatch.

Much has been written in New England and elsewhere about overfishing and the crash of New England groundfish stocks, as well as the adequacy of the science that forms the basis of our management actions. These debates have led to the perception that little is being done in New England to address our problems. In reality, nothing could be further from the truth.

To provide background, I am happy to report that peer reviews of our science have found the information has been on target and more than adequate for decision-making purposes. In fact, the most recent and comprehensive independent peer review of our groundfish stock assessments reaffirmed what some of us already knew, that our stocks are growing. One of the members of that group was so impressed that he reported, "The peer review meeting was the most optimistic assessment meeting that I have attended. For

the majority of (groundfish) stocks, fishing mortality has been gradually reduced, and in response spawning stock biomass is rebuilding."

It is ironic that while there are a number of reports and articles written about problems with the Magnuson-Stevens Conservation and Management Act and fisheries governance here in the U.S., internationally fisheries managers are looking at our successes and using them as a model. While we acknowledge significant challenges, that particular fact is very encouraging.

Now, where are we in terms of groundfish and ending overfishing? *Figure 1* illustrates stocks that are overfished, and also in an overfished condition. In 1996, eleven stocks were at low levels of abundance (overfished) and overfishing was occurring. Only one stock out of 18 was above one-half B_{MSY} (not overfished), nor was overfishing occurring. If we were to get a report card in 1996, the grade would indeed be an F. Eleven stocks were in the worst category, we had six stocks with no overfishing but at low levels of abundance and only one stock out of 18 above one-half B_{MSY}.

Where are we today? Again, ideally all stocks should be above one-half B_{MSY}, that is, not overfished, and with no overfishing taking place. Today, there are six stocks in this category (*Figure 2*). We have gone from zero to six out of the 18 in 2002. In 1996 we had 11 stocks in the worst category. Today we have only six — an overall accomplishment that is nothing short of impressive in only six years.

I would be less than honest to say that this is still a very troubling picture. We still have eight stocks above the line that delineates the overfished stocks. Many of these were in this same category six years ago. I'm not as concerned about the rebuilding timeline, as the fact that overfishing is still occurring. Fishing effort in some cases is still too high and has to be reduced. We have far greater control over this aspect of the fishery than the other biological parameters that affect recruitment.

In terms of the biomass of 12 of the major groundfish stocks considered in aggregate, *Figure 3* illustrates a steady increase, with some stocks growing faster than others, but nevertheless a steady increase. These same

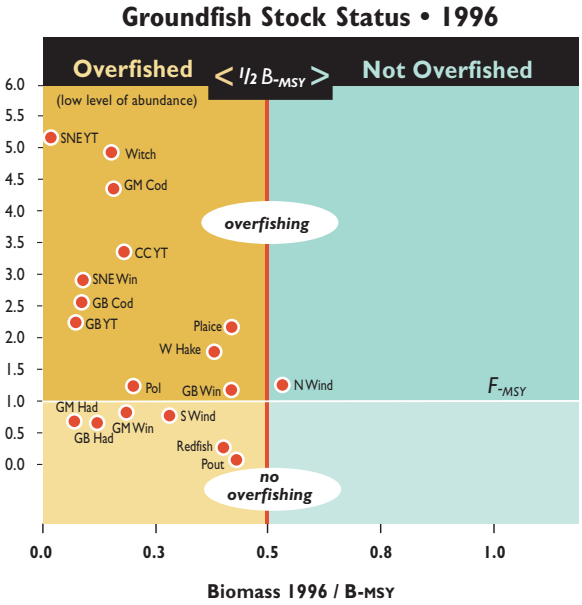


Figure 1
Groundfish stock status for 1996 indicated there was one stock that was not overfished and six stocks that did not experience overfishing.

Prepared by NEFSC using new NMFS reference points.

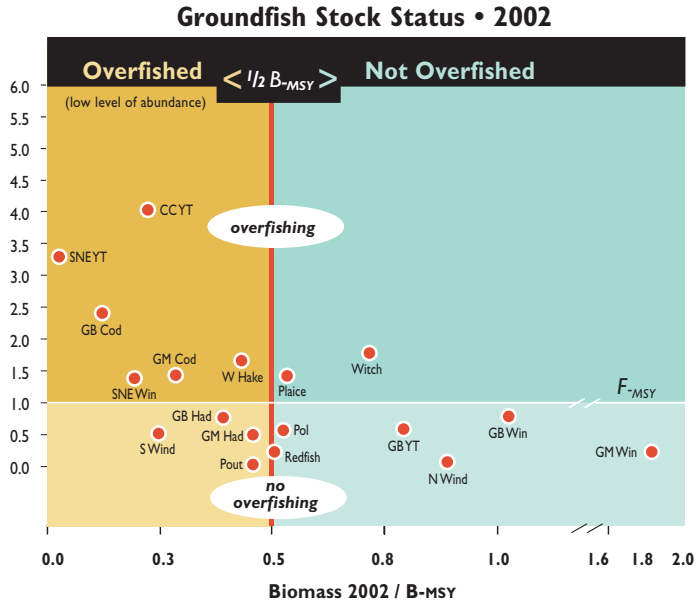


Figure 2
Groundfish stock status for 2002 indicated there were eight stocks that were not overfished and ten stocks that did not experience overfishing.

Prepared by NEFSC using new NMFS reference points.

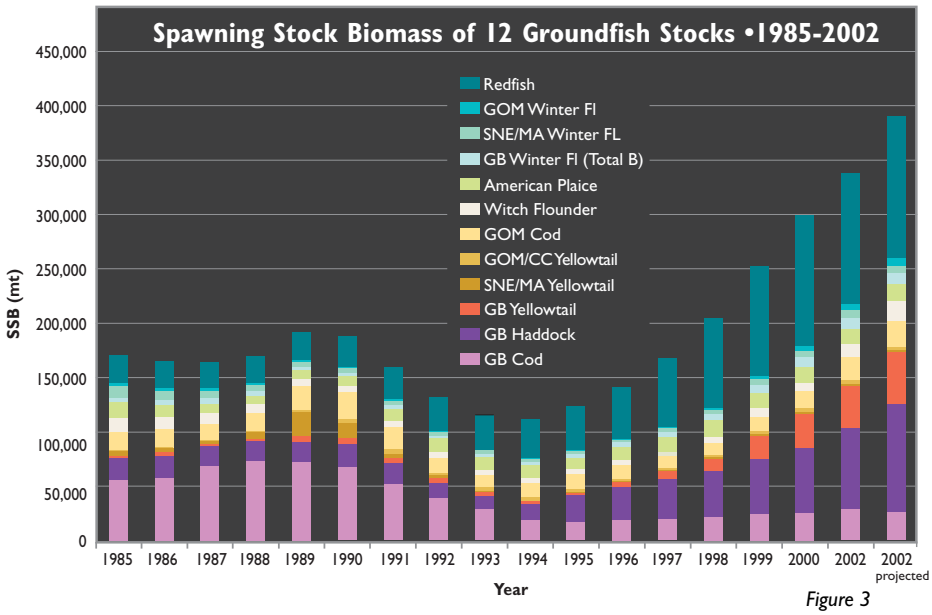


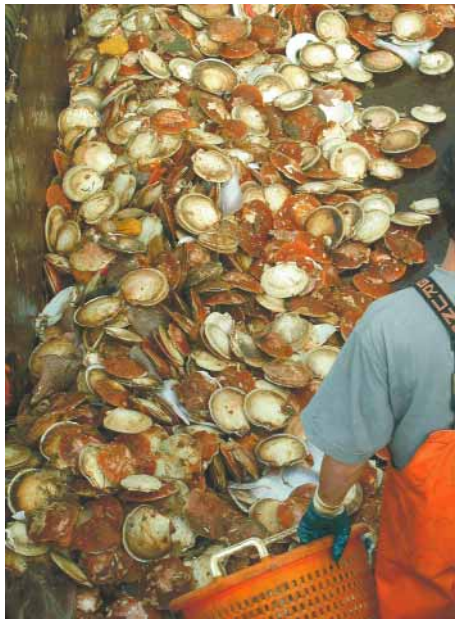
Figure 3

stocks fell to about 120,000 metric tons, an all-time low in 1994. We are now moving in the right direction. The prognosis looks very good for sustainable fisheries in New England.

I also will offer a word of caution here. The rebuilding target, in aggregate, for the groundfish complex is one million metric tons. Current figures indicate we are at 400,000 metric tons. Although we've more than tripled the spawning stock biomass of these stocks in a relatively short period of time, we have a very long way to go to get to the one million metric ton target. We are 40% of the way there.

The New England Council also manages Atlantic sea scallops. We have gone from overfishing and low abundance levels throughout the early 1990s to a point where the Georges Bank stock is rebuilt and well above B_{MSY} (*Figure 4*). Although the improvement is not as dramatic, the Mid-Atlantic stock of sea scallops is also above B_{MSY}. Again, in a short period of time, roughly ten years or less, the scallop resource has been rebuilt to sustainable levels. Moreover, we have reached biomass targets that many skeptics claimed could not be achieved. With tools such as closed areas, a reduction in days-at-sea, smaller crews and a larger ring size, and helped by good recruitment, we have reached sustainable levels very quickly. I offer a final word on this great success story. Scallop harvest levels have increased from 12 to 16 million pounds in the 1990s to about 55 million pounds landed today. This has been a win-win for the resource as well as the fishing industry.

Monkfish is another success if we examine our progress since 1999. In 2003 we are about 10% away from the point at which we are no longer overfishing, and stock rebuilding is occurring in a much more accelerated fashion than we anticipated. Rebuilding monkfish off the Mid-Atlantic area has not been as successful as rebuilding the northern stock of monkfish. We began in 1999 with a stock at below one-quarter of the total biomass



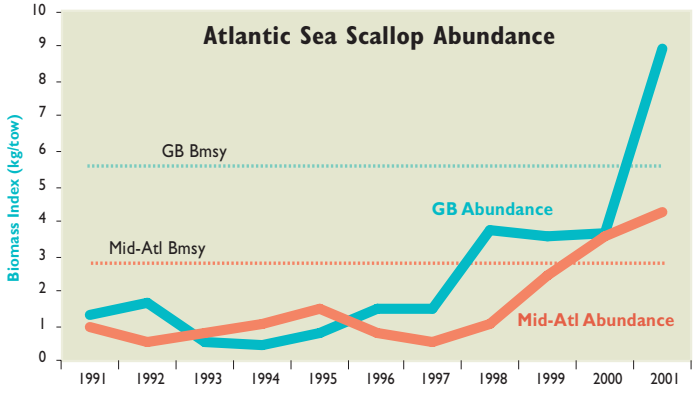


Figure 4

	Whiting North	Whiting South	Red Hake North	Red Hake South	Offshore Hake
Biomass Target Value	6.63	1.78	3.1	Not defined	Not defined
Biomass Threshold Value	3.31	0.89	1.6	0.12 kg/fish and 4.72 fish/tow	0.24 kg/fish and 0.33 fish/tow
Evaluation Criteria Value	10.44	1.38	6.0	0.1 kg/fish and 5.2 fish/tow	0.2 kg/fish and 0.8 fish/tow
Overfished?	NO REBUILT	NO	NO REBUILT	NO	NO

Table 1

target. If rebuilding occurs at the current rate, we should achieve the target for this stock component within the ten-year time frame.

Our small mesh multispecies fisheries harvest two stocks of whiting (silver hake), two stocks of red hake and one stock of offshore hake. Of the five stocks regulated by the management program, none are considered overfished (*Table 1*). Two of the stocks, northern whiting and northern red hake, are rebuilt and are well above their biomass targets. The biomass of the southern stock of whiting has improved significantly, and was at 71% of its biomass target (not overfished) in 2002.

The management program for small mesh multispecies encourages the development of selective fishing gear to minimize bycatch. Over the past few years, the Council has established several exempted fisheries for small mesh multispecies based on significant progress made through conservation engineering and cooperative research. Several new gear developments (raised footrope trawl, excluder devices) have allowed fishermen to prosecute the whiting fishery with a minimal bycatch of large-mesh multispecies that are the subject of intensive rebuilding efforts.

Herring too is another great success story. During the '60s and early '70s foreign fleets caused the total collapse of this stock. Today, the Council manages a highly abundant resource to achieve Optimum Yield based on the best available scientific information. The fishery management plan utilizes a "hard TAC" approach to ensure that overfishing does not occur. Hydroacoustic estimates of herring indicate that the total biomass of the complex is well above 1 million metric tons, which is well above the current biomass target. An amendment to the FMP now under development recognizes role of herring in the ecosystem and the importance of herring as a forage species for other commercially important fish species in the region.

In summary, what is our progress in eliminating overfishing, the primary tenet of managing sustainable fisheries? It is clear our improvements are noteworthy. It is also clear this is no time to celebrate. Our successes are fragile and there is much more to be done. We rely on input controls, which demand constant attention, and we have significant capacity issues that we must address. The severe restrictions recently approved by the Council for the groundfish fishery are a recognition of these challenges.

This brings us to the second tenet of managing sustainable fisheries, eliminating excess capacity. We still have several open access fisheries, including whiting and herring. Fishery management plan amendments scheduled for completion in 2004 will likely address capacity in the whiting and herring fisheries by establishing limited access programs. In the Groundfish, Scallop and Monkfish FMPs, all of which control effort by annually allocating days-at-sea to participants, there are many more days allocated than can be used and still expect stock rebuilding. As stocks do rebuild, more of the unused days are being activated, potentially jeopardizing the successes I described earlier.

The New England groundfish fishery illustrates the problem. Between 1996 and 2002 about 1,000 boats called in to report their days-at-sea use. There are 1,400 limited access permits and 1,000 boats actually fishing. If all 1,400 vessels used all the days-at-sea allocated to them, about 150,000 days would used overall to pursue groundfish. In reality, the 1,000 active vessels do not use all their days. Collectively, they use only about 65,000 days. As stocks have begun to improve, we have seen more of the previously unused days gradually creeping into the fishery, particularly over the last several years. The Council realized it had to

control this effort, but a U.S. District court judge addressed the matter for us.

A court-ordered settlement agreement, the end result of a successful lawsuit brought by several conservation groups against the National Marine Fisheries Service in late 2001, capped this "latent" effort in the groundfish fishery by specifying a qualification period of 1996 through 2001. Effective in May 2002, participants had to fish during this period to receive their new allocation of groundfish days — a reduction equal to the maximum amount of days fished in any one of those years, minus 20%. All others were awarded a minimum of ten days. Days-at-sea dropped in 2002 from 65,000 to 41,000 as a result of the judge's order. With the recent approval of Amendment 13 to our Groundfish Plan, this number should be further reduced to 32,000 days.

In the end are we successfully addressing capacity? Amendment 13 was a very controversial and complicated management action developed to reduce fishing effort and accelerate stock rebuilding. As of May 1, 2004 most fishermen will see a 20% decrease from the days they are currently allocated for groundfish fishing. In addressing excess capacity, we also allowed fishing permit transfers or the sale of permits, thereby promoting fleet consolidation. Also for the first time the Council has allowed day-at-sea leasing. A vessel of a certain size will be able to lease his or her days to another vessel of the same size or smaller. I would say we are making considerable progress in addressing excess capacity.

The third tenet of managing sustainable fisheries is protecting EFH. Today we have nearly 8,000 square miles of the most productive fishing grounds closed to mobile gear. We have in place roller and rockhopper gear restricted areas. We also have eliminated street-sweeper gear and are in the process of preparing an omnibus habitat amendment to look at Habitat Areas of Particular Concern as well as dedicated habitat research areas. We will focus efforts on protecting habitat in a more coordinated manner across our fishery management plans — adopting an ecosystem approach, if you will.

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The map in my presentation illustrates the extent of our closed areas (*Figure 5*). The year-round closed areas encompass prime fishing grounds and have been closed since 1994. While they were closed to rebuild fish stocks these areas have, nevertheless, provided an important platform from which to protect EFH. Very recently the Council closed portions of these areas indefinitely specifically to protect habitat.

Total bottom contact time and area swept by the scallop fleet has declined nearly three-fold, as a result of days-at-sea restrictions, crew limits, and area access programs combined with increasing scallop biomass.

Groundfish days-at-sea have been reduced by 60% since 1996, again, reducing bottom time in a mobile gear fishery. A monkfish plan amendment, scheduled for completion next year, contains measures to protect deepwater coral. Overall, in terms of EFH, I believe the New England Council is doing a much better job and will certainly strive to improve its efforts in the future.

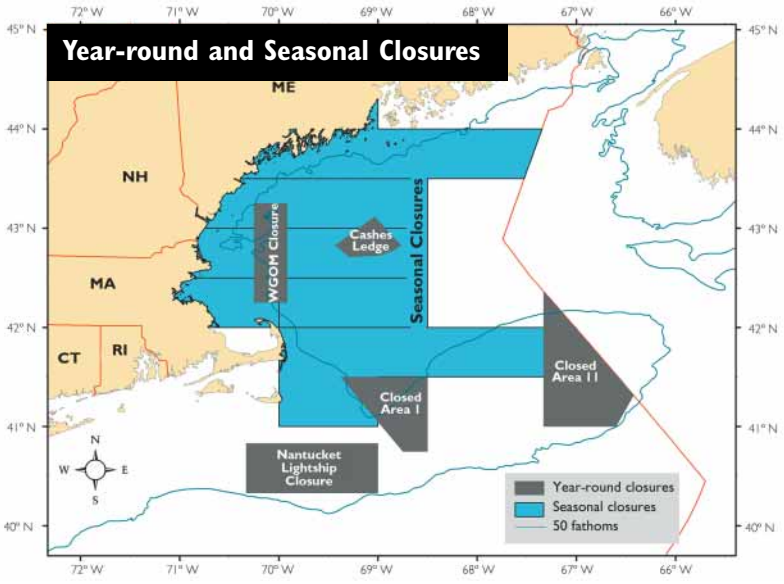


Figure 5

NOAA Fisheries

Codend mesh size and configuration study with an "outer bag" to collect selectivity information.

The last tenet of managing sustainable fisheries is to minimize bycatch. The Council's strategy is to first collect accurate data. As we know from experience, the most reliable data is from observers, a very, very costly tool, however.

We also need to come up with better tools to rationalize or justify what constitutes "the extent practicable." We need to develop optimization models. If you're going examine the myriad of issues associated with bycatch, i.e. the health of non-target species, the health of the targeted species, and the social and economic impacts of each of those bycatch and directed fisheries, we need to do a better job at determining what is "the extent practicable" Optimization models can assist us.

Our strategy also includes the support of cooperative research, as well as the development of incentives to avoid bycatch. In New England, managers and fishermen alike learned the hard way that low trip limits are not very effective conservation measures because of the associated bycatch and discard problems. The best tool of all to minimize bycatch is to maintain all stocks at or close to B_{MSY}. You are then able to avoid the problem of restricting the harvest of healthy stocks for the sake of species that are at low levels of abundance, but are part of the mix taken as bycatch.

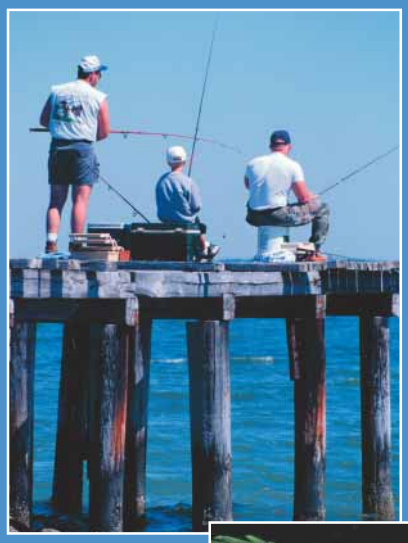
A number of bycatch reduction measures are currently place and deserve some recognition. In New England we use the largest mesh in the world to pursue groundfish, six-and-a-half and seven inches. An exempted fisheries program, adopted in the early 1990s, prohibits any gear capable of catching groundfish from fishing in the very large groundfish regulated mesh areas unless it has demonstrated a 5% or less by weight bycatch of groundfish species. Increased possession limits are utilized where necessary and special access programs have been adopted, allowing the harvest of abundant species in an otherwise closed area. Once the target and specific non-target species caps are reached the fishery closes and the areas are once again closed.

We also have developed special gears to reduce bycatch. The State of Massachusetts conducted research on a raised footrope trawl in our whiting fishery. The results enabled the prosecution of the whiting fishery with flatfish bycatch dramatically reduced.

The northern shrimp fishery in the Gulf of Maine requires the use of a grate, a mechanism that for years has reduced the bycatch of juvenile groundfish. The recently approved sea scallop amendment will implement an adaptive area rotation plan that involves industry in data collection and monitoring, raises the minimum scallop dredge ring size from three to four inches, and raises the minimum twine top mesh size from eight to ten inches. Both are expected to reduce the bycatch of small scallops and finfish.

To briefly recap our approach to bycatch — there is an absolute need to obtain better information. Despite that weakness, we have an extensive list of measures to reduce or minimize bycatch, for which very little credit is given. And lastly, observers, study fleets, more selective gear and cooperative research, in coordination with effective management measures are key to minimizing bycatch.

In summary, the status of our stocks is improving. The gains accomplished over a relatively short period of time are downright impressive. Future long-term prospects are excellent as long as stocks continue to rebuild. Our new groundfish, scallop and monkfish amendments should allow this trend to continue and to also address the problems of capacity, bycatch, and habitat.



2. Mid-Atlantic
Fishery Management Council

Room 2115 Federal Building ◗ 300 S. New Street ◗ Dover, Delaware 19904 ◗ Phone: (302) 674-2331 ◗ www.mafmc.org

The Mid-Atlantic Fishery Management Council is the largest of eight regional management councils established by the Magnuson-Stevens Act. Over the last several decades, the Mid-Atlantic Council has made remarkable strides to conserve and protect the living marine resources in federal waters off the Mid-Atlantic coast. Working in partnership with the states and federal government, the Council has made the tough management decisions required to successfully accomplish its mission in building sustainable fisheries. Balancing the rebuilding of fish stocks with the economic and social impacts to recreational and commercial fishermen, the Council has developed effective fishery management programs that have reversed decades of overfishing for many of the stocks in the Mid-Atlantic region. The Council has primary management authority for 12 species along the Atlantic coast and currently 10 of these species are fully rebuilt or are steadily rebuilding.

The Mid-Atlantic Council consists of representatives from New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and North Carolina. However, the management units for most of the species managed by the Council extend beyond the waters of those states — some as far north as Maine others as far south as Florida. There are 25 members (21 voting, 4 non-voting), representing state and federal agencies and the public. Council members are citizens of these states who are knowledgeable of fisheries. The non-voting members represent executive level positions in the U.S. Fish and Wildlife Service (Department of the Interior), the U.S. Coast Guard, the State Department, and the Atlantic States Marine Fisheries Commission.

(Photos above, left to right)
Flounder fisherman.
Squid boat.
MAFMC

Fishing offf the pier, Virginia.
Edward J. Pastula, NOAA Fisheries

Sea bass.
Ocean quahogs.

MAFMC

The Council also has over 70 industry advisors serving on a number of species and Technical committees to advise the Council in plan development and possible impact of management measures. Membership of the advisory panels is diverse and includes representatives from the commercial and recreational fishing industries, and environmental groups.

Fisheries and Management Plans

The Mid-Atlantic Council has developed six fishery management plans (FMPs) for fisheries in the region. A review of these FMPs is provided in the following sections.

Surfclam and Ocean Quahog FMP

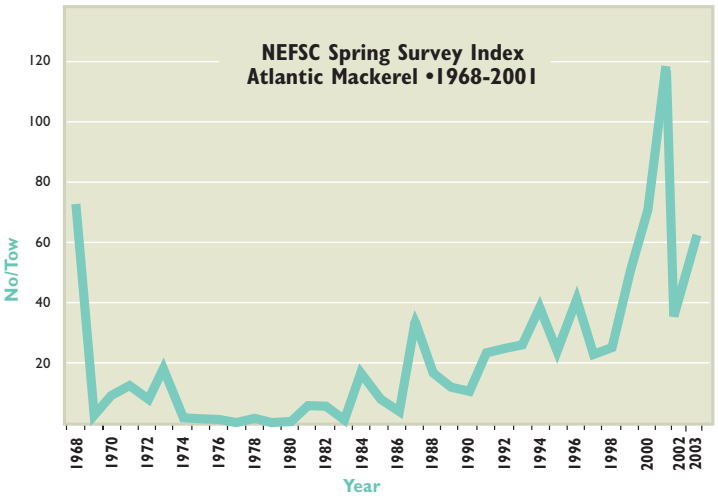
The Council has been very successful in managing the species under its jurisdiction. One of the most successful management plans developed by the Council is the Surfclam and Ocean Quahog FMP. Surfclams are the predominant species landed in the Mid-Atlantic in 2002; over 71 million pounds of surfclams were landed with an exvessel value of 40 million dollars. The Surfclam and Ocean Quahog fisheries are now managed under an Individual Transferable Quota (ITQ) program, the first in the nation. Under the Council's management, these fisheries are not overfished and overfishing is not occurring.

The Council began discussing the management of surfclams and quahogs at their first meeting in September 1976. Between 1977 and 1990 the Council developed the FMP and seven separate amendments. The reason for all the attention was that the surfclam resource had just about collapsed as evident in the landings data. In 1974, nearly 100 million pounds of surfclams were landed; however, by 1976 landings had declined to only 60 million pounds.

During the first decade of management, the regulatory burden associated with the Councils management plans and amendments had a significant negative impact on the Council and clam fishermen even as the resources rebuilt. In fact, it was calculated at one time that more than one third of all Council activity during the 1980s was devoted to these two species. During that period an overall quota system was implemented. As a result, the industry had to deal with specific closed areas, large surfclam minimum size limits, discard restrictions and significant reductions in the hours they could fish because of an overall quota. The average vessel was fishing nearly 1,800 hours per year when the FMP was implemented. By the mid-1980s, effort was restricted to six 6-hour fishing trips per quarter or 144 hours per vessel per year.

As the result of this regulatory burden, the Council began consideration of another management approach in the late 1980s. In the fall of 1990, the Council and the National Marine Fisheries Service (NMFS) established the nation's first federal ITQ management system. This system allows individuals the flexibility to harvest their annual share of the quota, or to lease or "sell" a portion or all of their harvest rights to others. In the surfclam and ocean quahog fisheries, ITQs had major positive impacts: the number of vessels in the fishery dropped from 128 to less than 40 reducing the overall tonnage in the fleet from over 18,000 GRT to about 6,000 GRT, tripled the average harvests per vessel from 24,000 bushels to over 70,000 bushels, eliminated derby fishing, and increased the profits per participant.

Even with this success, the Council continues to be active in the management of surfclams and ocean quahogs. Surveys and assessments are conducted every three years and recently the Council submitted Amendment 13 to the FMP that, if approved, will establish a new overfishing definition for surfclams and allow for the establishment of multiyear fishing quotas.



Atlantic Mackerel, Squid, and Butterfish FMP

The Mid-Atlantic Council also has management authority for Atlantic mackerel, *Loligo* squid, *Illex* squid, and butterfish. These four species are primarily commercial species and all are managed under a quota based management system in one FMP (Atlantic Mackerel, Squid, and Butterfish). Relative to their biological reference points, all four of these species are not overfished and overfishing is not occurring.

Atlantic mackerel have a long history of commercial exploitation off the northeastern coast of the U.S. dating back to colonial times. American colonists of the 1600s considered mackerel one of their most important staple commodities. Atlantic mackerel landings increased throughout the 19th century to a peak of about 220 million pounds in 1889. Following this peak in the late 1800s, the fishery changed significantly as vessels changed from sail to motor power and market demand shifted from salted to fresh mackerel. Average landings subsequently declined to about 52 million pounds for the period 1925-1949. Landings gradually declined further during the next decade, falling to 13 million pounds in 1959. The arrival of the European distant water fleets in the early 1960s resulted in a dramatic change in the fishery. In fact, landings increased to over 770 million pounds by 1973. This expansion of the fishery led to overfishing and depletion of the mackerel spawning stock.

The implementation of the Magnuson Act significantly restricted landings by foreign vessels and landings were reduced to less than 1 million pounds by 1978. Low catches from 1978 to 1993 and improved recruitment allowed the stock to rebuild. In 1993, the Council prohibited foreign fleets from participating in the Atlantic mackerel fishery. This restriction allowed the mackerel stock to rebound so that it is no longer overfished. In addition, overfishing is not occurring and the resource is now considered "underexploited."

Like mackerel, the distant-water foreign fleets heavily exploited the *Loligo* and *Illex* squid and butterfish fisheries during the 1960s. Foreign fishing was regulated in 1983 when the Council initiated management of these species under the Atlantic Butterfish FMP. One of the primary goals of this plan was to Americanize these fisheries by eliminating foreign fishing in U.S. waters and maximizing opportunities for growth and development of the resources by American fishermen and processors. In effect, the Council's management program allowed for the species to be fully utilized by the domestic fisheries.

The plan implemented annual quotas, seasonal quota allocations, trip limits during directed fishery closures, mesh size restrictions for *Loligo*, limited entry for *Loligo*, butterfish and *Illex*, dealer permits, incidental catch permits, and dealer and vessel reporting requirements. Currently, the two squids and butterfish are no longer overfished and overfishing is not occurring.

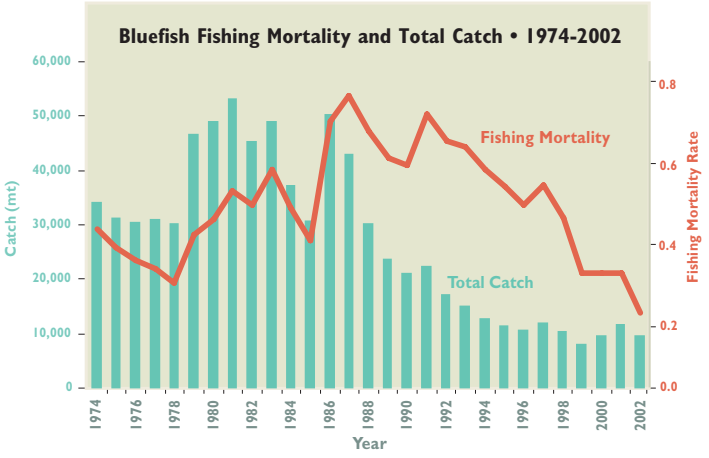
The Council recently submitted Framework 4 to the Atlantic Mackerel, Squid, and Butterfish FMP for Secretarial approval. The sole purpose of that framework is to extend the moratorium on entry to the *Illex* fishery which is set to expire in July 2004. Framework 4 was developed because the original FMP had a sunset provision that allowed the moratorium to expire due to concerns that capacity might be insufficient to fully exploit the annual quota. However, analysis of current harvest capacity for the *Illex* fishery indicates that the maximum harvest capacity of current permit holders does exceed the long term yield for the species. As a result, the Council placed a high priority on development of this framework.

The Council has also begun discussions to address issues relative to future access to the commercial fisheries for *Loligo* squid and Mackerel. The development of a controlled access plan for mackerel became a higher priority since the New England Council recently initiated the development of Amendment 1 to the Atlantic herring FMP which considers controlling access to the herring fishery. Given the significant interrelationship between the herring and mackerel fisheries, the Council placed a high priority on the controlled access plans in both of these fisheries. These issues will be addressed in Amendment 10 to the Atlantic Mackerel, Squid, and Butterfish FMP.

Bluefish FMP

Another species successfully managed by the Council is bluefish. Like the previous species, current stock assessment information indicates that overfishing is no longer occurring. In addition, the latest information on the stock also indicates that bluefish may no longer be overfished.

Bluefish is primarily a recreational species. In fact, during the 1980s bluefish was consistently one of the top three species most frequently sought by marine recreational fishermen along the Atlantic coast of the U.S. In 1981, recreational landings were estimated to be 95.3 million pounds. In the late 1970s, potential markets for bluefish in Africa and South America stimulated tuna purse seiners to consider harvesting bluefish. This interest prompted concerned fishermen to petition the Council to develop an FMP for bluefish. In addition, the Council was aware that the resource was becoming overexploited as the result of significant increases in commercial and recreational landings. The overexploitation of the resource caused the bluefish stock to decrease from 207.5 million pounds in 1981 to 68.4 million pounds in 1990.



The Council prepared an FMP that was rejected by the Secretary of Commerce in 1984 primarily because it only affected the portion of the stock in the EEZ. As a result, the Council worked cooperatively with the Atlantic States Marine Fisheries Commission to prepare an FMP which was approved by NMFS in 1990. That FMP limited the commercial fishery to 20% of the total catch annually and restricted recreational anglers to a possession limit of ten fish.

In the late 1990s, Amendment 1 to the Bluefish FMP was developed and later approved in 1999. This amendment included a nine-year rebuilding schedule, a state-state commercial quota system, and a recreational harvest limit. The implementation of these management measures directly coincides with a decline in fishing mortality rates. In fact, an update on the status of the bluefish stock indicates that the fishing mortality rate on bluefish peaked in 1987 at 0.718 and has steadily declined since then to 0.184 in 2002. Because this F is below the biological reference point, ovefishing is no longer occurring.

One interesting aspect of the Bluefish FMP that has caused some concern allows for a transfer of quota between the recreational and commercial sectors when the recreational fishery is projected to not take their entire harvest limit. These transfers have generated some controversy regarding the effect of the transfers on the rebuilding program. However, during the last three years, the recreational and commercial sectors have landed about 59% of the total authorized landings. By allowing modest transfers of recreational allocations to the commercial sector, the Council has attempted to recognize its mandate to address National

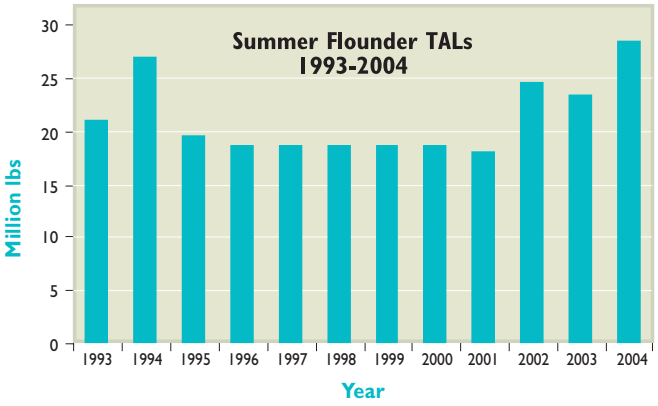
Standard 8 regarding the social and economic consequences of the fisheries and, at the same time, consider the implications of National Standard 9 regarding the minimization of bycatch.

Given the controversy regarding bluefish as well as concerns regarding the current bluefish assessment, the Council is currently working with the Commission's technical committee and a contractor to develop a new assessment for bluefish. That assessment will be reviewed by a stock assessment review committee in June 2004.

Summer Flounder, Scup, and Black Sea Bass FMP

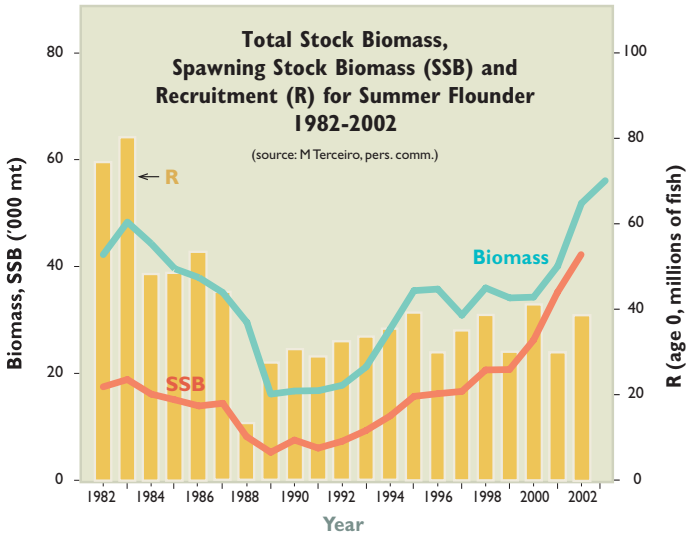
The Council also has management authority for a suite of demersal species including summer flounder, scup and black sea bass that are managed under one FMP. As has been mentioned repeatedly in the press, the summer flounder stock has responded dramatically to the management measures adopted by the Council and implemented by NMFS and the states. Summer flounder was the second most valuable finfish landed by commercial fishermen in the Mid-Atlantic in 2002 with an ex-vessel value of 13.1 million dollars. Recreationally, it is one of the most sought after game fish in the Mid-Atlantic region. Recreational landings in 2002 exceeded 8 million pounds. In 2003, for the first time since the Council and Commission began management of summer flounder, the stock assessment indicated that the stock was no longer overfished and overfishing was no longer occurring. Based on the stock assessment the Council and Board adopted an increase in the summer flounder total allowable landing level (TAL) of 28.2 million pounds for 2004, the highest summer flounder TAL ever.

In 1988, the Summer Flounder FMP was implemented by NMFS. Unfortunately, 1988 was also the year of a recruitment failure in the summer flounder stock. Because the fishery was highly dependent on incoming recruitment at that time, commercial and recreational landings dropped dramatically in 1990. Landings and survey values for summer flounder were at an all time low.



The Council responded to these declines by developing Amendment 2 to the Summer Flounder FMP. Amendment 2, a comprehensive amendment first fully implemented in 1993, contained a number of management measures to regulate the commercial and recreational fisheries for summer flounder. As mentioned previously, management measures have had a positive impact on the stock. In fact, spring survey information for 2003 indicates the summer flounder resource has reached the highest levels ever recorded since the survey began in 1968.

Information from this survey combined with 2003 survey data from the states and other Northeast Fisheries Science Center surveys, as well as data from the commercial and recreational fisheries, were used to update the assessment in 2003. This latest stock assessment indicates that spawning stock biomass (SSB) has steadily increased each year since 1993 when Amendment 2 regulations were first implemented. In fact, SSB



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has increased from a low of 11.5 million pounds in 1989 to almost 93 million pounds in 2002, an increase of over 700%. Total stock biomass as of January 1, 2003 was estimated to be 124 million pounds which is above the biomass threshold of 117 million pounds. In addition, the estimate of fishing mortality for 2002 was 0.23 (18% exploitation rate) which is below the overfishing definition reference point of 0.26 (21% exploitation rate) and a drop of almost 90% compared to the value estimated for 1992.

Rebuilding of the summer flounder resource has resulted in some additional concerns for the Council. For example, increases in stock abundance have resulted in overharvest by recreational fishermen. As a result, the FMP was modified to allow for conservation equivalency — a management approach that sets harvest limits for each state and allows each state to develop its own individual management measures. In 2002, there was no overharvest by recreational fishermen.

Also, the current plan requires that the allowable landings be divided between the commercial and recreational fishermen using a 60/40 ratio. In a recent petition for rulemaking, a group of recreational fishermen requested that NMFS review that allocation and modify the formula to a 50/50 allocation formula. In turn, the NMFS requested that the Council review the current formula and decide if it should be changed. The Council will conduct that review in 2004.

The issue of regulatory discards in the summer flounder fishery has also become a concern to a number of fishermen in several states as the stock size has increased. In general, coastwide discard rates are low — less than 10% in 2002. However, discards rates are higher for fishermen from states that target other groundfish, catch summer flounder, and are then faced with low or no summer flounder possession limits in their home state. Modifications to the plan that may reduce regulatory discards will be considered in 2004.

Another species managed under the Summer Flounder, Scup and Black Sea Bass FMP is scup. The Council has managed scup since 1996 when regulations impacting the scup fisheries were incorporated into the Summer Flounder plan as Amendment 8. Amendment 8 implemented a rebuilding schedule and a number of commercial and recreational management measures (i.e., commercial quotas, gear requirements, minimum size limits, recreational harvest limits and permit and reporting requirements) to reduce mortality on juvenile and adult scup, and allow for rebuilding of the scup stock. At the time the plan was implemented, the commercial and recreational landings of scup had dropped dramatically and indices of stock size were at an all time low. Since the management measures have been in place, scup abundance has increased so dramatically that despite a required 36% decrease in exploitation for 2002, the allowable landing level increased 103%. Based on the latest spring survey results scup are no longer overfished. However, some have argued that this increase came to soon and at the expense to the stock. Because of concerns related to the assessment, the Council is developing a proposal to find a stock assessment scientist that can work with the Commission's Technical Committee to develop an assessment for scup for consideration in June 2004.

Bycatch has become an important issue for scup management, specifically the bycatch and discard of scup in the small mesh fisheries for *Loligo* squid. In 2000, regulations were implemented that created gear restricted areas (GRA) off the Mid-Atlantic coast. These areas, the Northern and Southern GRAs, were identified as areas where high levels of scup discarding could and had occurred. The adoption of the GRAs as a management tool was highly controversial due to the loss of access to important fishing grounds by *Loligo* fishermen.

Since the implementation of the GRAs, the Council has been extremely interested in gear modifications that would reduce the catch of scup in the *Loligo* fishery and allow access to those areas by those squid fishermen. Based on research funded by the Council, scientists found that a large mesh panel in the extension portion of the codend significantly reduced scup bycatch. As a result, for 2003, regulations were modified to allow fishermen using this panel access to the closed areas.

Since then additional research has indicated that the panel may not be as effective as first thought and more research is being conducted to evaluate additional gear modifications. For 2004, the council is recommending a gear access program that would allow vessels in the areas with modified gear. This access program would allow small mesh gear in the closed areas until a closure was triggered when a level of scup discards was projected to be reached.

The last species in the suite of demersal species managed by the Summer Flounder, Scup, and Black Sea Bass FMP is black sea bass. The Council considered the development of a Black Sea Bass FMP in 1990 and management measures were developed and incorporated into Amendment 9 of the Summer Flounder, Scup and Black Sea Bass FMP in 1996. These management measures included commercial quotas, gear requirements, minimum size limits, recreational harvest limits and permit and reporting requirements.

Since the Council began managing the black sea bass fishery in 1996 stock size has increased significantly. Spring survey values which are used as a proxy for spawning stock biomass indicate that spawning stock biomass has steadily increased to the point that survey values now exceed the threshold. As such, the stock is no longer considered overfished.

Relative exploitation rates have also dropped significantly indicating a reduction in fishing mortality. However, because an estimate of fishing mortality is not available, a determination of whether or not overfishing is occurring for this species cannot be made. In

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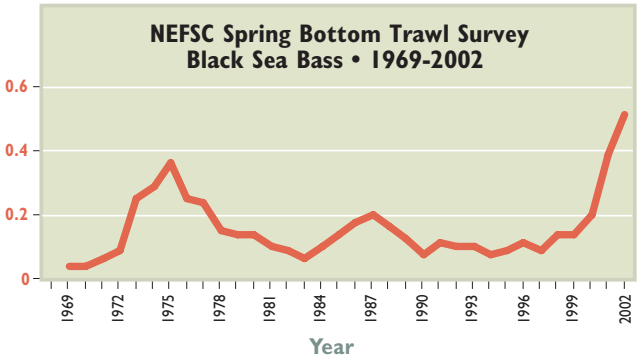
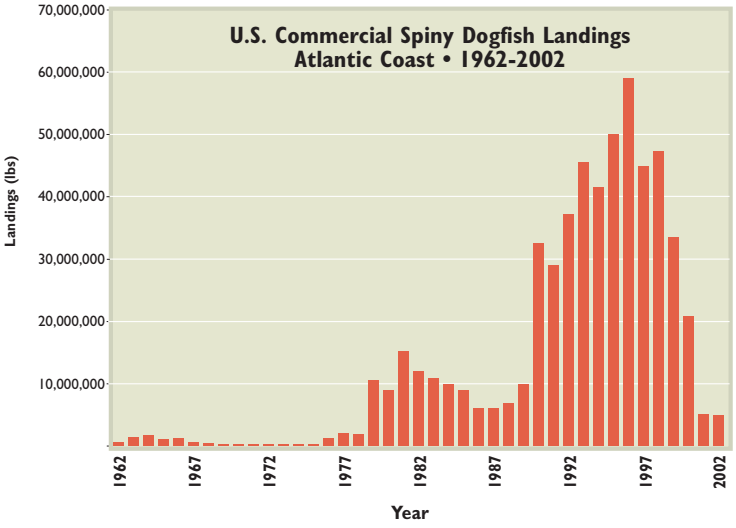


response to this lack of information, Council staff has participated in a coordinated tagging study to over the last couple of years to determine mortality rates. The results from that study will be used in a stock assessment that will be reviewed in June 2004.

Spiny Dogfish FMP

The Council has only recently developed a management plan for spiny dogfish. Initially, dogfish was considered to be "underutilized" and possessing very little value. However, increased market demand stimulated a directed fishery for spiny dogfish that resulted in a ten-fold increase in landings from 1987-1996 and the species was designated as overfished in 1998.

The large increase in landings came at the expense of the spawning stock. The current assessment information indicates that there had been a significant drop in the number of adult females over the last several years. In addition, there has been little or no recruitment. The Mid-Atlantic Council and the New England Council coordinated efforts to recover the stock and jointly developed a plan which was implemented in the spring of 2000. The plan requires a very restrictive annual quota that has dramatically reduced the directed fishery targeting adult females. In fact, fishing mortality



rates have been so reduced that overfishing is no longer occurring for spiny dogfish.

There has been a lot of controversy surrounding spiny dogfish recently. Management actions are complicated by the fact that four management entities are involved (Mid-Atlantic Council, New England Council, NMFS, and the Commission) in the U.S.. The Council will develop Amendment 1 in 2004. That amendment will include a rebuilding schedule and a biomass target based on the latest stock assessment information. That amendment may also revise the way the quota is allocated.

Tilefish FMP

The Council also recently developed a fishery management plan for tilefish. The tilefish fishery began off the mid Atlantic and southern New England coasts in the early 1900s. Landings increased in the early 1970s and in 1998 landings were estimated at 2.7 million pounds. NMFS declared tilefish overfished in the spring of 1998. In 1999, the Council developed the Tilefish FMP and the Secretary approved it in 2001. A plan was developed to rebuild the tilefish stock over a 10-year period and includes a constant harvest strategy with a projected total allowable catch of nearly 2 million pounds annually.

In the Tilefish FMP, as with the other FMPs, the Council addressed the Essential Fish Habitat (EFH) provisions of the Sustainable Fisheries Act. In their FMPs, the Council has argued that overall reductions in fishing mortality and fishing effort have had a positive impact on stock status and also have acted to protect EFH. In addition to reductions in fishing mortality, the Council has also implemented regulations that have indirectly acted to reduce fishing gear impacts on EFH for all the managed species. These regulations include restrictive harvest limits, the ability to establish special management zones, and restrictions on roller rig gear.

During the development of the public hearing draft of the tilefish plan, habitat areas of particular concern were identified for tilefish off the coast of New Jersey and New York. The plan noted that because tilefish are structure-oriented and it was possible that bottom-tending mobile fishing gear could have an adverse impact on their habitat. After a scientific review that concluded that there was no evidence of negative impacts on tilefish habitat. The Council submitted the FMP without any specific management measures to prohibit trawl gear in those areas. This action was challenged in court. The plaintiffs lost and the Court ruled there was ample evidence in the record to support the Council's recommendations. Nonetheless, the plan did call for additional coordinated research among the fishing industry, NMFS, the conservation community and the Council and that research is ongoing.

Other Progress

The Mid-Atlantic Council is not without its challenges. One of the biggest challenges facing the Council has involved a lack of information. Despite the efforts of the National Marine Fisheries Service to provide the most reliable data, budget and personnel constraints create shortfalls in the quality, completeness, timeliness, and accuracy of such data.

In response, the Council implemented a Research Set Aside program in 2000 to encourage cooperative research with the fishing industry to collect data. That data can then be used to develop more effective management programs for the species that are managed by the Council. The program involves a detailed grants process that allows for the establishment of set aside quotas each year. The quota is then available to any applicant that successfully competes in the program.

The funds generated from the sale of the individual set aside quotas are then used to conduct the approved research project. Research to date has been diverse and has included studies that evaluate the effect of escape vents in black sea bass traps, test the effectiveness of escapement panels in trawl nets to reduce bycatch of scup, and the development of a supplemental finfish survey.

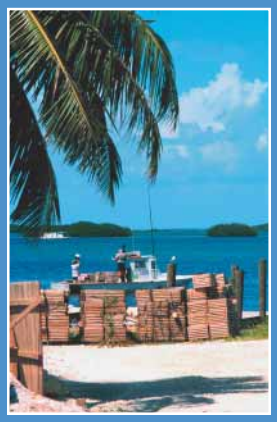
And last, but certainly not least, the Council has developed an effective, highly successful outreach program in recent years. The Council process has always been a public process that encourages public participation at various levels. Initially the Council dedicated little or no resources to a public affairs program. However, with the additional complexity of management plans, and increased public interest, the Council quickly realized the importance of communication and education. Initially, the Council established an Information and Education Committee. However, the Council quickly realized that it needed a dedicated professional to develop and lead the program and created a Public Affairs position in 1999. The Public Affairs Officer has served as a spokesperson for the Council and is the Council's primary media contact. The Public Affairs Officer is responsible for the Council's web site and a number of outreach materials including regulation brochures, press releases, newsletters, and annual reports. All of this has served to increase public interest, communication and education and ultimately enhanced the Council's fishery management programs.

Recently the Council conducted a survey to evaluate the current program. A total of more than 1500 surveys were sent out and more than 400 people responded, an extremely high return rate. Results indicated that the current public affairs program should be continued. In addition, respondents indicated that the Council should conduct more educational meetings for constituents to inform them about the management programs and provide a more detailed summary of our regulations. In addition, they indicated that the Council should provide more material that details the current management process and finally develop and

MAFMC website.

provide more information on the species that are managed by the Council. These Survey results will be used to modify the current program and may also be used by other Councils and NMFS to develop and enhance their public affairs programs.

In conclusion, the Mid-Atlantic Council has made remarkable strides to conserve and protect the marine resources under its jurisdiction. In fact, the Council recognizes that together with the Commission, coastal states, NMFS and commercial and recreational fishermen, it has been very successful in the management of the species that it is charged to manage. In fact, 10 of 12 species that the Council has primary management authority for are rebuilt or rebuilding — 6 are fully rebuilt, 9 are no longer overfished and for 11 of the 12 species overfishing is not occurring. The Council is committed to their current management programs for these species and has developed additional programs to enhance their management plans including a Research Set Aside and Public Affairs programs. The Mid-Atlantic Council also realizes that there are significant challenges ahead in addressing the concerns associated with the management of these stocks and looks forward to continued success as those challenges are met and addressed.



3. South Atlantic
Fishery Management Council

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The South Atlantic Fishery Management Council is responsible for the conservation and management of fish stocks off the coasts of North Carolina, South Carolina, Georgia and the East Coast of Florida south to Key West. The Council meets four times a year, once in each state within its region. The Council's primary function is to prepare fishery management plans and make recommendations to the Secretary of Commerce (Secretary) for regulations in each fishery that requires conservation and management in the Council's jurisdiction.

Council members are citizens from each of these states who are knowledgeable of, or participate in, some aspect of the fisheries. They serve three-year terms and are appointed by the Secretary from lists of nominees submitted by the governors of the states. In addition, the directors (or designees) of each state's marine resource management agency and the Southeast Regional Administrator of the National Marine Fisheries Service (NOAA Fisheries) serve on the Council as voting members. There are a total of 13 voting members. Non-voting members include representatives from the U.S. Fish and Wildlife Service, U.S. Coast Guard, U.S. Department of State, and the Atlantic States Marine Fisheries Commission. Although the non-voting members cannot vote at the Council sessions, under South Atlantic Council policy they can vote during committee meetings.

(Photos above, left to right)
Stone crab fishermen.
Wm. Folsom, NOAA Fisheries

Reef off North Carolina.
C. Liipfert, NOAA Fisheries

Fishing boats.
A quiet harbor.
Happy fishermen.
Kim Iverson, SAFMC

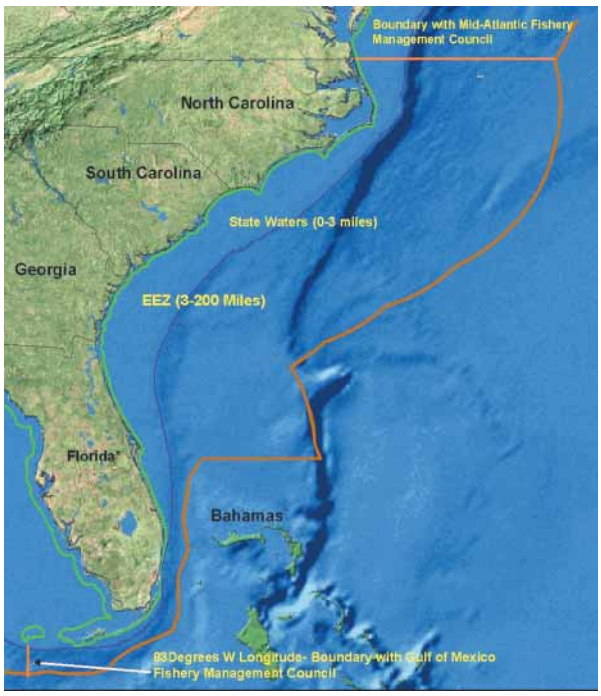
Public participation in the development of fishery management plans (FMPs) is the cornerstone of the Magnuson-Stevens Fishery Conservation and Management Act. The Council management system was created with the intent that individuals with a stake in the marine resources being managed have a voice in how they are managed. The

Council makes every effort to include input from all stakeholders in the decision-making process. This helps ensure that the broadest range of alternatives is considered when developing management strategies. Before any changes to regulations are made, resource users have opportunities to participate in the process through a series of public scoping meetings, public hearings, and at Council meetings. In addition, the Council receives guidance and recommendations from state and federal agencies, universities, and members of the public who serve on various Council committees and advisory panels. Proposed rule changes are then submitted to NOAA Fisheries (acting on behalf of the Secretary) for further review, public comment, and approval before being implemented.

Maintaining an open line of communication with the resource users is crucial to achieving successful fisheries management. It is important that stakeholders understand the basis for developing specific management strategies and why resulting actions are necessary for the sustainability of the resource. Without this understanding it is difficult to obtain support for many of the management decisions that must be made, and ultimately, improve compliance with the regulations that are implemented.

The Council continually communicates its management goals, strategies, and activities to the public. This is accomplished through a number of mechanisms including news releases, meeting announcements, a quarterly newsletter, a website, and species and regulation brochures. An Information and Education Committee and Advisory Panel also work to ensure constituents are regularly informed of management activities.

The South Atlantic Council has developed nine fishery management plans: coastal migratory pelagics, coral, golden crab, red drum, shrimp, snapper/grouper, spiny lobster, *Sargassum* and dolphin/wahoo. (The latter is currently undergoing Secretarial review.) There are also forty-five amendments to the eight FMPs currently in place.



SAFMC

South Atlantic Bight and SAFMC Jurisdictional Boundaries.

When developing a fishery management plan or an amendment, the Council must take into consideration numerous factors including the following:

- The status of the stock of fish — are they overfished or is overfishing occurring?
- The social and economic consequences of the management measures being considered — what are the impacts on people and fishing communities?
- The mandates of other federal laws with which the Council must comply — are the procedures under the National Environmental Policy Act and other applicable laws being met?
- How to allocate the harvest between different resource users — is the allocation fair and equitable across user groups throughout the geographic range of the fishery?
- Impacts of the fishery on essential fish habitat (EFH) — will the management measures proposed harm or protect EFH?
- If bycatch is occurring in the fishery — what regulations will be necessary to eliminate bycatch to the greatest extent possible?

The Council depends on NOAA Fisheries, state marine fisheries agencies, and research conducted by universities and private sector scientists for data used in management decisions. "Fishery-dependent" data are collected from commercial and recreational fishing activities through such mechanisms as commercial logbooks, landings information from fish house operators (trip tickets) and recreational data collected through the NOAA Fisheries' Marine Recreational Fisheries Statistics Survey. Scientists conducting research independent from commercial and recreational fishing efforts collect "fishery-independent" data. Recently, funding for programs to directly include the fishing industry in data collection has become available, and these projects are underway.

Fishery managers use both fishery-dependent and fishery-independent data to conduct stock assessments and to develop management measures based on those assessments. The Council, in conjunction with NOAA Fisheries, has recently implemented the Southeast Data, Assessment, and Review (SEDAR) process, a multi-step method for determining the status of fish stocks. The process involves data collectors, biologists, fishermen, environmental representatives, database managers, stock assessment scientists, as well as Council members and staff throughout each step. Although similar processes are used in other areas of the country, the South Atlantic Council is the first to include fishermen and environmental representatives in the process as stock assessment review panel members.

Public Participation and The Fishery Management Process

Public involvement plays a key role in the development of fishery management plans (FMPs) and other regulatory actions. The Council promotes constituent participation at every level of the process. Before moving forward with any FMP or amendment, public input is solicited through scoping sessions, public hearings, workshops, and Council meetings. Individuals unable to attend meetings or that prefer not to speak can provide written comments throughout this process. Various advisory panels and committees also

Kim Iverson

provide input and recommend management options. When completed, proposed actions are then submitted to NOAA Fisheries for further review and additional public comment before being approved and implemented by the Secretary of Commerce.

Scoping Sessions

The purpose of scoping is to give the public the opportunity to comment before the Council develops a position on management. Scoping sessions are required by the National Environmental Policy Act (NEPA) and are also part of the pre-management plan and amendment process under the MSFCMA. A scoping session allows individuals to comment on or suggest measures they think may be appropriate for management of the fishery being addressed.

Public Hearings

Public hearings are different from scoping sessions in that they are held later in the process and the public is asked to comment on a specific range of alternatives for each proposed management action. Usually, the Council has chosen a preferred alternative for each proposed action.

Workshops

When addressing a complex or controversial management issue, a series of workshops may be held to bring together a diverse group of knowledgeable individuals. This approach was used to determine appropriate sites for deepwater marine protected areas. Workshops have most recently been initiated to develop strategies for ecosystem-based management.

Council Meetings

Prior to any final action, the public is always given an opportunity to address the Council and comment on

the action being considered. Also, during the development of management measures, individuals are often allowed to speak at committee meetings to offer advice to the members.

Advisory Panels (AP)

Members of the Council's advisory panels provide grass roots input. The APs offer continuing advice on FMPs, amendments, and other regulatory actions for each fishery. They frequently comment on how their personal experience (e.g., what they see on the water, at the docks, or in the market) agrees or disagrees with data being used to develop management alternatives. Often, AP members raise specific concerns about a fishery and offer suggestions for management options to address them. The South Atlantic Council depends heavily upon the knowledge and experience of advisory panel members when considering options for a new plan or plan amendment. These diverse panels include recreational and commercial fishermen, headboat and charter operators, seafood buyers and sellers, conservationists, consumers and federal and state agency representatives who are knowledgeable about a particular fishery. The Council currently has 15 separate advisory panels, comprised of 207 members. Advisory Panels include: Calico Scallop, Coral, Dolphin/Wahoo, Golden Crab, Habitat and Environmental Protection, Information and Education, King and Spanish Mackerel, Law Enforcement, Marine Protected Areas, Protected Resources, Rock Shrimp, Shrimp, Shrimp Bycatch Reduction Device, Snapper/Grouper, and Spiny Lobster.

Scientific and Statistical Committee (SSC)

The Council's SSC is composed of experts in the biological, statistical, economic, social, and other relevant disciplines from federal, state, and private scientific communities who are knowledgeable in the technical aspects of fisheries in the South Atlantic. Throughout the management process, the SSC provides expert scientific and technical advice to ensure that the Council's plans and amendments are based on the best scientific information available.

Southeast Data, Assessment, and Review (SEDAR) Panels

Members include data collection experts, recreational and commercial fishermen, environmental representatives, population dynamics scientists and outside peer reviewers. The three-part SEDAR process uses different panels to (1) assess available data for a specific stock assessment, (2) conduct the stock assessment, and (3) peer review the assessment and provide recommendations that the Council uses to develop management strategies. Members include data collection experts, recreational and commercial fishermen, environmental representatives, population dynamics scientists, and outside peer reviewers.

NOAA Fisheries

Spotlight on Public Involvement

It is 6:00 am. The sky is just beginning to show the waking signs of a new morning. The ice has been loaded and the baits prepared. The engines are fueled and idle at the dock, while the dock lines are being readied for departure. There is an air of anticipation as last minute provisions are loaded onboard. Soon it will be time for the fishing trip to begin.

This scenario is repeated hundreds of times each morning as fishermen take to the ocean to target the day's catch. A charter boat with tourists, a head boat loaded with convention visitors, a diver with the latest scuba equipment, a commercial fisherman preparing for a week-long trip, a tournament fisherman seeking prize

money, or a family on a weekend outing — all head out searching for their own "hot spots," many hoping to bring fish back to the dock.

Here in the South Atlantic it is not unusual to see all of these people heading out of the same inlet on any given day. The recent U.S. Census confirms the continued migration of the nation's population to the coast. As fishing pressure increases, so do the impacts on the resources the Council is mandated to conserve and manage. The Council must continue to balance issues of allocation, sustainable fisheries, habitat protection, and the social and economic ramifications of their decisions. In order to do so, it is imperative that constituents are involved throughout the Magnuson-Stevens Act process.

User conflicts can also result as more and more people compete for their piece of the fish resource pie. Recently, the Council addressed conflicts between hook and line fishermen and divers using powerheads in northeast Florida. After hearing public testimony, a solution was reached that will eventually minimize localized conflict. Participants in the public hearing process played a major role in resolving this problem. A few other examples of stakeholder involvement in management decisions include:

- Development of a limited access program for the rock shrimp fishery with qualifying criteria was based on recommendations directly from fishermen and the industry.
- The Council was considering prohibiting all fishing in the *Oculina* Experimental Closed Area off of Ft. Pierce, Florida to protect overfished species in the snapper/grouper complex. However, after hearing from the public regarding the significant impact on the recreational fishery for pelagic species such as dolphin, wahoo, tuna, sailfish, and mackerel, a decision was made to only close the area to fishing for the snapper/grouper complex (bottom fishing) and to allow trolling for the pelagic species.

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- When a limited access program was being developed for the snapper/grouper fishery, a group of mostly retired part-time fishermen (calling themselves the "gray hairs") did not qualify for a permit as the program was proposed. Through the public process they requested a limited harvest permit be issued to fishermen who had a history of smaller catches (often used to supplement retirement income). As a result, the Council incorporated a separate 225-pound trip limit, non-transferable permit into the program, allowing these fishermen to continue to fish during their lifetime.
- Realizing the controversy associated with the concept of marine protected areas, the Council held numerous public scoping sessions and workshops to address stakeholders concerns. These efforts helped promote an information exchange, understanding, and consensus among the various constituencies and the Council. This resulted in nine sites being considered for MPA designation.
- As king mackerel stock assessments indicated this resource was in good shape, the Council asked for public comment on an option to allow for increases in the bag limit. Fishermen spoke against more liberal bag limits and requested the Council maintain the more restrictive bag limits that were in place to ensure the king mackerel resource remained at good sustainable levels. The Council complied.

These depict only a few of the many ways that constituents impact the fishery management process. Other examples can be found throughout this document. Whether it involves service on an advisory panel, testifying at a public hearing, providing written comments, or participating in stakeholder workshops, the Council encourages everyone to get involved.

Fisheries and Management Plans

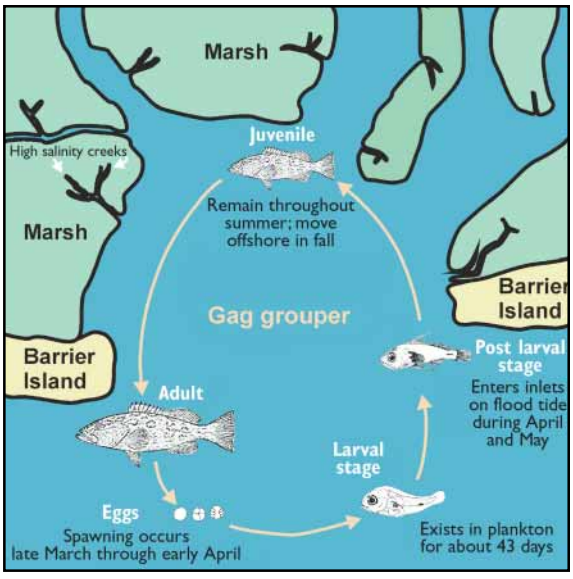
The Council currently manages eight fisheries (a ninth, dolphin/wahoo, will soon be added). These fisheries include coastal migratory pelagics, coral and live bottom habitat, golden crab, red drum, shrimp, snapper/grouper, spiny lobster, and *Sargassum*. Of these nine fisheries, only two contain species that are considered overfished — red drum and snapper/grouper. Recreational and commercial harvest of red drum from the EEZ has been prohibited since 1990. Currently, the Council is in the process of transferring management to the Atlantic States Marine Fisheries Commission, as 100% of the catch is taken in state waters. Both the recreational and commercial sectors in the snapper/grouper fishery are highly regulated and progress continues to be made as more species are removed from the overfished list each year. Management measures are in place to ensure that the remaining seven fisheries continue to be maintained at productive, sustainable levels into the future.

The Snapper/Grouper Complex — A Multi-Species Challenge

Of the 98 species managed by the Council, 73 are included in the snapper/grouper management complex. Because of its mixed-species nature, this fishery offers the greatest challenge to the Council for successful management. When first implemented in 1983, FMP regulations consisted of minimum sizes, gear restrictions, and a provision for the designation of special management zones (SMZs). Early attempts to develop more effective management measures were thwarted by lack of data on both the resource and the fishery. The condition of many of the species within the snapper/grouper complex was, and still is, unknown. Improved data collection (in terms of quantity and quality) during the 1980s and 90s has provided additional information on some of the more commercially and recreationally valuable species, but lack of basic data on many of the species still remains the major obstacle to successful management.

Snapper/grouper management is also difficult because many of these species have complex life cycles. They are slow growing, late maturing, and long lived, so rebuilding efforts for some species will take years to produce full recovery. Strict management measures, including prohibition of harvest in some cases, have been implemented to rebuild overfished species. For example, both Goliath grouper (since 1990) and Nassau grouper (since 1992) are protected from any harvest, and strict limits are in place for speckled hind and Warsaw grouper.

To address overcapacity in the fishery, the Council established a program to limit the number of vessels. Beginning in December 1998, anyone wishing to enter the commercial fishery must buy two transferable vessel permits in order to qualify for a newly issued permit, thus eliminating one permit each time a new person enters the fishery. Known as the "2 for 1" program, this management strategy has been effective in reducing participation in the fishery and pressure on



SCDNR, Marine Resources Division

Kim Iverson

the resource. This program will continue until the number of permits an optimum level to be determined based on the long-term yield of the fishery.

Many of the rebuilding plans developed by the Council for snapper/grouper species predate mandates outlined under the Sustainable Fisheries Act in 1996. The Council is currently developing an amendment to the Snapper/Grouper FMP to bring all species in the management complex into compliance with SFA requirements. In addition, the Council is moving forward with plans to evaluate the use of marine protected areas to rebuild the deepwater species that are overfished.

Wreckfish and ITQs — Cooperative Management at Work

The presence of fishable concentrations of deepwater wreckfish in the South Atlantic region was unknown until 1987, when a directed fishery developed on the Blake Plateau adjacent to South Carolina and Georgia. The fishery rapidly expanded as additional fishermen considered wreckfish as a new commercial opportunity. Fishermen, scientists, and managers became concerned that the resource could not support unlimited expansion. With cooperation from the fishermen, the Council developed a wreckfish management plan that includes individual transferable quotas (ITQs). Under the quota system, each wreckfish fisherman owns a share of the quota and can choose to fish it anytime during the open season. This prevents an opening day rush to bring fish to market and assures fishermen a stable, reasonable price.

Coastal Migratory Pelagics — A Success Story

Management of coastal migratory pelagics, including king and Spanish mackerel, is a shining example of the effectiveness of proper management. Prior to the 1980s, king and Spanish mackerel catches were essentially unregulated. Introduction of airplane reconnaissance and large, power-assisted gill net vessels in the commercial fishery took advantage of the schooling nature of the fish and greatly increased catches. Harvests by both recreational and commercial fishermen in the 1970s and early 80s exceeded reproductive capacity and led to overfishing. Federal regulations were implemented in 1983 to control harvest and rebuild dwindling stocks of king and Spanish mackerel. Different migratory groups were later managed separately, and quotas, bag limits and trip limits were established to rebuild the mackerel fisheries. Gear regulations included the elimination of drift gill nets in 1990. Management measures developed by the Council for the Atlantic migratory groups of king and Spanish mackerel have been very successful in rebuilding stocks, and the mackerel fishery remains a viable one for both recreational and commercial fishermen.

Dolphin and Wahoo — A Precautionary Approach

Known for their brilliant colors and delicate taste, dolphin or "mahi-mahi," are one of the most popular and economically important fish targeted by offshore fishermen along the Atlantic coast. Historically, landings of dolphin have been primarily recreational, with approximately 87% caught by sport fishermen. Although both dolphin and wahoo (a pelagic fish often associated with the dolphin fishery) are not overfished, the Council has adopted a precautionary approach to management for this fishery. The South Atlantic Council, in cooperation with the Mid-Atlantic and New England Councils, has developed a Dolphin/Wahoo Fishery Management Plan for the Atlantic. Recognizing the importance of the dolphin/wahoo fishery to the recreational fishing community, the goal of the plan is to maintain the current harvest levels of both species and ensure that no new fisheries develop. The potential for effort shifts in the historical commercial longline fisheries for sharks, tunas, and swordfish into nearshore

coastal waters to target dolphin could compromise the historical and current allocation of the dolphin resource between recreational and commercial fishermen.

Sargassum — The Habitat Connection

Sargassum is a free-floating seaweed found offshore throughout the South Atlantic region. These mats of vegetation provide crucial habitat for a wide variety of marine animals in the open ocean, including important pelagic species such as tuna, dolphin, wahoo, and billfish as well as sea turtles and marine birds. The final FMP for Pelagic *Sargassum* Habitat in the South Atlantic Region was approved in 2003 and implemented strict limits on commercial harvest of this important habitat. In the past, a North Carolina company harvested *Sargassum* for use in the feed supplement industry. The approved plan, however, implements strict limitations on future commercial harvest. Restrictions include prohibition of harvest south of the NC/SC state boundary, a total allowable catch (TAC) of 5,000 pounds wet weight per year, limiting harvest to November through June to protect sea turtles, requiring observers onboard any vessel harvesting *Sargassum*, prohibiting harvest within 100 miles of shore, and gear specifications.

Golden Crab — A Leap of Faith: Co-management with Industry

When the Council prohibited fish traps in the snapper/grouper fishery in 1992, a few of the displaced trap fishermen began developing a specialized fishery for golden crabs. Harvesting of this little known species required fortitude and ingenuity in developing gear modifications to trap the deepwater crabs. The Nielsen family of Dania, Florida, was instrumental in developing harvesting techniques and creating a market for golden crab. This encouraged other fishermen to join the fishery. As the fishery began to grow, these same fishermen who had been displaced earlier by the Council from their snapper/grouper trap fishery, showed a remarkable good faith effort by approaching the Council with their own management proposal for the golden crab fishery. This plan, approved in 1995, included measures to protect the stock, as well as a limited

Bill Mansfield

Spiny lobster.

entry program to protect them from large vessels entering the fishery from outside the area. The Council worked cooperatively with the fishermen to provide a sustainable fishery opportunity. It developed a management plan that would eventually limit the number of fishermen in established fishing zones (southern, middle, and northern) and implemented the protective measures for the crabs as outlined by the fishermen. This management strategy has been effective to the degree that the Council is in the process of adding more vessels to the northern zone. The Golden Crab FMP represents an excellent example of co-management involving fishermen and the Council.

Spiny Lobster — Enhanced Cooperative Management

The FMP for Spiny Lobster in the Gulf of Mexico and the South Atlantic manages spiny lobster from North Carolina to Texas. However, the commercial fishery for spiny lobster, and to a very large extent, the recreational fishery, occurs off South Florida and primarily in the Florida Keys. In order to streamline a management process that involves both state and federal jurisdictions, a protocol was developed that allows the state of Florida to adopt proposed rules through their management process. Provided the rules are consistent with the goals and objectives of the FMP and both Councils concur, a regulatory amendment is prepared, a comment period is held, and NOAA Fisheries can implement the rule in a manner that is more timely than an FMP amendment. Current regulations in the spiny lobster fishery in Florida include a commercial trap reduction program, a closed season, a special recreational two-day season before the commercial

season, recreational trip limits, gear prohibitions, and prohibition on the possession of egg-bearing lobsters. In federal waters off the Carolinas and Georgia, harvesting is allowed year-round but harvest for all fishermen is limited to two per person per day, and no "berried" (egg bearing) females can be harvested.

Shrimp — State and Federal Cooperation

The commercial shrimp fishery is one of the most economically important fisheries in the nation. While not overfished, the white shrimp resource in the South Atlantic region is periodically decimated by severe winter kills, especially offshore of Georgia and South Carolina. Following these events continued fishing on the few remaining adults in the spring might reduce the more valuable fall shrimp production. The Council's Shrimp FMP allows for concurrent closures of federal waters in conjunction with state closures through emergency action, following severe cold weather that results in an 80% or more reduction in the population of over-wintering shrimp. The ability to close federal waters to protect overwintering spawning white shrimp was used in 1991 and again in 2001 to rebuild the stock after significant winter kills. This cooperative plan allows maximum protection of the remaining adult population.

Other challenges in the fishery that the Council addressed include the bycatch of non-targeted fish and invertebrates and the impact of the rock shrimp fishery (trawling) on essential bottom habitat. To resolve the bycatch problems, the Council required the use of certified bycatch reduction devices (BRDs) in all penaeid (pink, white, and brown) shrimp trawls in the South Atlantic EEZ and established a framework for BRD certification. The Council also limited the impact of the rock shrimp fishery on bottom habitat by prohibiting trawling in the *Oculina* Bank to protect *Oculina* coral off the coast of Florida. Beginning October 2003, all vessels trawling for rock shrimp off the coast of Florida and Georgia will be required to use vessel monitoring systems (VMS). VMS provide the exact location of vessels while fishing. The use of VMS will aid in the enforcement of regulations protecting rare and fragile *Oculina* coral habitat in areas closed to trawling. With the ability to close federal waters to protect spawning white shrimp, the requirement for BRDs to minimize bycatch, and the prohibition on rock shrimp trawling in *Oculina* coral areas, the Council has developed a successful management program for the shrimp fishery where it occurs in the EEZ.

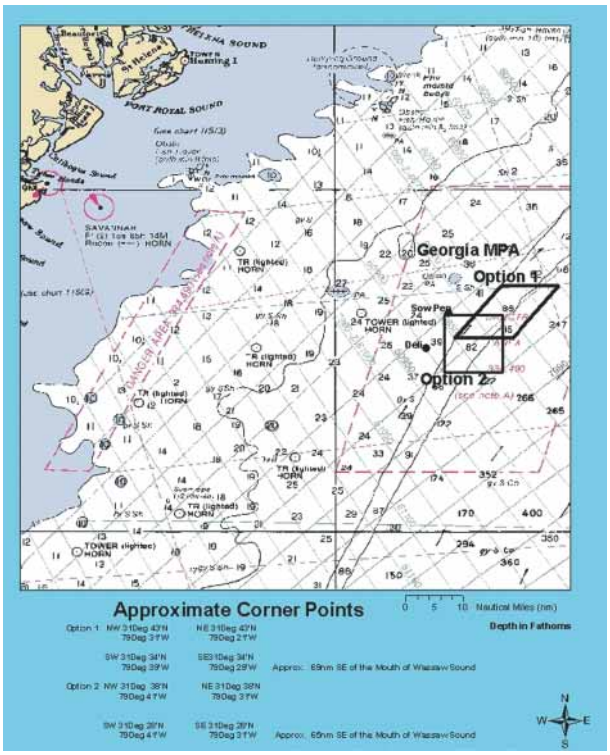
Florida National Marine Sanctuary, NOAA Fisheries

Coral and Hardbottom Habitat

The Coral, Coral Reef, and Live/Hardbottom Habitat Plan prohibits harvest of stony corals, seafans, coral reefs, and live rock (living marine organisms attached to a hard substrate) except as authorized for scientific and educational purposes. The harvest of allowable octocorals for the aquarium trade is limited in number and only allowed south of Cape Canaveral, Florida. Aquaculturists in the marine aquarium trade have greatly benefited from a unique permit program created by the Council in 1995. This system allows permitted aquaculturists to put geologically distinguishable rock in their permit site. The rock can later be harvested with any growth, including prohibited hard corals and octocorals as long as they are attached to the cultured rock.

In addition Coral Habitat Areas of Particular Concern (HAPC), the *Oculina* Bank, and Satellite Coral HAPCs have been designated in the South Atlantic. Within those areas, habitat damaging fishing gear is prohibited including bottom tending trawl gear, traps, dredges, and bottom longlines. Anchoring or the use of grapples is also prohibited for all fishing vessels.

Proposed Georgia MPA Option 1 and Option 2 for species in the deepwater snapper/grouper complex.



SAFMC

Other Management Approaches

In addition to the traditional management tools commonly used to manage fisheries, such as size and bag limits, commercial trip limits, and seasonal closures, the Council utilizes special management areas as part of its management strategy. These specifically designated areas provide opportunities to limit gear usage and gain increased knowledge about species protection. In the future, the Council is considering using series of marine protected areas throughout the South Atlantic to protect deepwater snapper/grouper species.

Special Management Zones (SMZs)

Since 1983, the Council has had a program allowing the designation of SMZ to provide an incentive for creating artificial reefs and fish attraction devices to increase the numbers of fish in an area and/or create fishing opportunities that would not otherwise exist. Designation of an area as a SMZ allows for gear restrictions in the area to prevent over exploitation. Many of these areas have been established through cooperation with fishing organizations and local governments and serve as a means to promote localized conservation and positive fishing experiences. A total of 51 SMZs have been designated off South Carolina, Georgia, and Florida.

The Oculina Experimental Closed Area

In 1994, an area previously designated the *Oculina* Bank HAPC off Ft. Pierce in eastern-central Florida was declared the *Oculina* Experimental Closed Area. The 92-square mile area, named for the unique coral found there, was closed to fishing for snapper/grouper species, and later to anchoring by fishing vessels, for a period of 10 years to allow for scientific studies in a closed area. Designation of an area where deepwater species such as snowy grouper, golden tilefish, speckled hind, and Warsaw grouper can grow and reproduce without being subjected to fishing mortality provides a unique opportunity for study. The Council has taken action to extend the closure indefinitely for further protection and research.

Marine Protected Areas as a Management Tool

After reviewing scientific data, advisory panel recommendations, and public input, the Council concluded that MPAs are a necessary tool for snapper/grouper management in order to meet mandates outlined in the Sustainable Fisheries Act. The snapper/grouper species complex is uniquely difficult to manage. In this multi-species fishery, many fish that are prohibited from harvest are still being caught and killed. Even when released alive, fishing mortality can still be high. Complicated life histories and tendencies for some species to form spawning aggregations also make these fish more susceptible to being overfished. Deepwater snapper/grouper species such as speckled hind, Warsaw grouper, snowy grouper, golden tilefish, and others are especially vulnerable. The Council concluded the most important criteria for considering MPA sites at this time is the protection of these deepwater species. Nine preliminary candidate sites are currently under consideration for MPA designation in the South Atlantic region, based on this need for protection. These sites have been compiled after nearly two years of public meetings, input from numerous advisory panel members, and committee review. Because the majority of these sites are designed to protect deepwater species, all but one (an experimental site) will only prohibit bottom

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fishing while allowing fishermen to troll for pelagic species such as tuna, dolphin, mackerel, and billfish. The public will continue to play a major role in the decisions concerning the use of MPAs.

The South Atlantic Council defines MPAs within its jurisdiction as "a network of specific areas of marine environments reserved and managed for the primary purpose of aiding in the recovery of overfished stocks, and to ensure the persistence of healthy fish stocks, fisheries and habitats. Such areas may be over natural or artificial bottom and may include prohibition of harvest on a permanent or lesser time period to accomplish needed conservation goals."

Protected Resources and Fisheries Management

Management Strategies that Benefit Sea Turtles, Marine Mammals, and Sea Birds

Though not directly managed by the Council, sea turtles, marine mammals, and sea birds are known to interact with various fisheries; thus measures within fishery management plans need to comply with regulations concerning these protected species. A variety of gear types can impact these species; however, entanglement in gill nets, longlines, trawls, and trap gear are of most concern. Several management strategies implemented by the Council help reduce the risk of incidental capture of sea turtles, marine mammals, and sea birds. Under the Snapper/Grouper FMP, the Council prohibited the use of bottom longlines inside of 50 fathoms. Overall, the use of entanglement nets is prohibited or restricted in fisheries under the Council's jurisdiction.

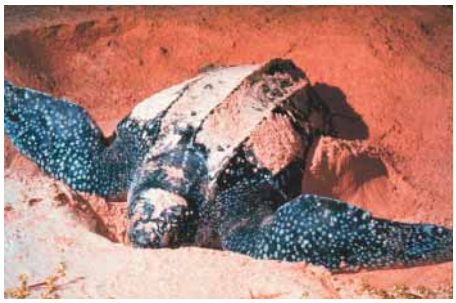
Turtle excluder devices (TEDs) are required in shrimp trawl nets to protect sea turtles in the South Atlantic. NOAA Fisheries has shown that TEDs are effective at excluding up to 97% of sea turtles with minimal loss of shrimp. Industry representatives participate in reviewing new designs for TEDs, many of which are submitted by the shrimp fishermen. NOAA Fisheries ensured that the TED requirements were phased in gradually, and has provided numerous workshops and programs to work with the industry regarding TEDs.

In addition, the Council actively promotes and participates in efforts that improve communication among state and federal agencies as well as numerous stakeholders on issues relating to protected species and fisheries. The Council has established a Protected Resources Committee and a Protected Resources Advisory Panel, and is currently involved with the Bottlenose Dolphin Take Reduction Team and the Atlantic Large Whale Take Reduction Team. Take Reduction Teams are set up under the Marine Mammal Protection Act to assist NOAA Fisheries in developing plans to mitigate serious injuries and mortalities incidental to commercial fishing operations.

Bycatch

The Council has a history of proactively addressing bycatch. Prior to the bycatch mandates contained in the Sustainable Fisheries Act, the Council had addressed bycatch in the fisheries under management. Currently, all managed fisheries in the South Atlantic have reduced bycatch to the greatest extent practicable.

Fishermen are also doing their part in trying to reduce bycatch. The recreational industry has developed



Canaveral National Seashore, NOAA Fisheries

specialized gear and handling techniques that minimize the release mortality of undersized or over the bag limit fish (regulatory discard bycatch). "How to" books and videos that provide this information are readily available and the methods described have been widely adopted by fishermen. Recreational fishermen have also developed a strong catch and release ethic, which has helped reduce bycatch and overall fishing mortality. In the commercial fisheries there continues to be a concerted effort in all fisheries to modify old gear and to design new gear to reduce bycatch. The development of bycatch reduction devices (BRDs) by fishermen in the shrimp fishery is an excellent example.

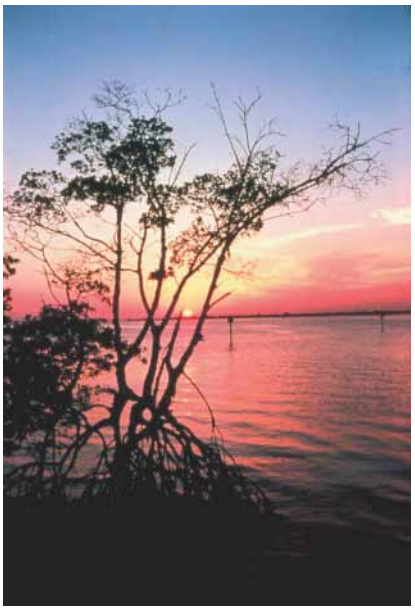
Certified BRDs are required in all penaeid shrimp (white, pink, and brown) trawls in the South Atlantic EEZ to reduce the bycatch of non-target finfish and invertebrates. A framework has been established for BRD certification, which specifies BRD certification criteria and testing protocol. Mandating use of BRDs in coordination with the States has provided for a consistent set of bycatch conservation regulations in the South Atlantic. The adoption of compatible state/federal regulations has aided enforcement, simplified the regulatory burden on the industry, and insured the biological goal of bycatch reduction is achieved.

To reduce bycatch in the snapper grouper species complex the Council has prohibited the use of trawl gear, fish traps, entanglement nets and bottom longlines inside of 50 fathoms. Black sea bass pots are required to have escape vents and degradable panels. All of these measures have proven to effectively reduce bycatch in the fishery. Bycatch that does occur in the commercial and recreational hook and line fisheries is mainly associated with the release of undersized fish (regulatory discards) caught in deep water. Regulatory discards are being addressed in an amendment to the Snapper/Grouper FMP.

The Council has prohibited the use of drift gill nets in the coastal pelagics fishery. Where gill nets are used to target these species minimum mesh sizes are required. These management measures have significantly reduced the regulatory discards. Species other than coastal pelagics taken in the net fishery generally have market value and are retained and do not constitute a bycatch. In the hook and line fishery, release mortality (regulatory discards) of coastal pelagics is minimal due to the fishing methods employed and areas fished.

Golden crab and spiny lobster traps are required to have escape gaps and degradable panels which effectively eliminates regulatory discard bycatch and any bycatch associated with lost traps continuing to fish. Due to the deepwater areas golden crab traps are fished there is no other bycatch in the fishery. The Council examined the issue of finfish bycatch in lobster traps, especially traps constructed of wire, and determined from the information available that finfish bycatch is minimal and additional regulations are not warranted.

Habitat Conservation



NOAA Fisheries

From deepwater canyons off the Carolinas to the shallow tropical waters surrounding the Florida Keys, marine habitats found in the South Atlantic region are as diverse as the species that inhabit them. The Council is at the forefront of habitat conservation and risk-averse management, taking the lead in the protection of habitat essential to managed species. Recognizing that sustainable fisheries are directly dependent on functionally healthy habitat, it has adopted a proactive approach to protect and enhance Essential Fish Habitat

OAR/NURP

(EFH) as required by the Magnuson-Stevens Act. In addition, the Council is pioneering the application of the ecosytem-based approach to fisheries management in the South Atlantic region. Ultimately, by broadening the scope of management, the Council will achieve long-term sustainability of fisheries and of the system as a whole.

The Council actively manages fisheries to protect habitat from the direct or indirect impacts of fishing by adopting the following regulations:

Snapper/Grouper FMP

- Prohibits the use of bottom longlines inside of 50 fathoms or anywhere south of St. Lucie Inlet, Florida;
- Prohibits the use of fish traps;
- Prohibits the use of bottom tending (roller-rig) trawls on live bottom habitat;
- Prohibits the use of entanglement nets; and
- Establishes an Experimental Closed Area in the *Oculina* HAPC.

Shrimp FMP

- Prohibits rock shrimp trawling in the *Oculina* Bank; and
- Requires Vessel Monitoring Systems (VMS) on vessels participating in the rock shrimp fishery off Florida and Georgia.

Coral, Coral Reef, and Live/Hardbottom Habitat FMP

- Prohibits all harvest or possession of these resources which serve as EFH to many managed species, with the exception of the limited harvest of soft coral by permit; and
- Establishes and expands the *Oculina* Bank HAPC.

In addition to implementing regulations to protect habitat from fishing related degradation, the Council actively comments on non-fishing projects or policies that may impact fish habitat. A habitat policy and procedure document has been adopted that establishes a four-state Habitat Advisory Panel and developed a comment and policy process. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. With guidance from the Advisory Panel, the Council has developed and approved policies on: energy exploration, development and transportation, beach dredging and filling and large-scale coastal engineering, protection and enhancement of submerged aquatic vegetation, and alterations to riverine, estuarine, and nearshore flows.

In 1998, the South Atlantic Council developed its Habitat Plan and Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans for the South Atlantic Region. The Habitat Plan and associated amendment were the first in the nation to be approved by the Secretary of Commerce and not challenged in court and overturned. This plan serves as a source document, consolidating the best available information on habitat essential to species managed in the South Atlantic, from the headwaters of river systems to off the continental shelf. The Habitat Plan was prepared through a cooperative effort of state, federal, and regional habitat partners on the Council's Habitat and Coral Advisory Panels.

The *Sargassum* FMP is another effort undertaken by the Council to provide long-term protection to pelagic fish habitat. Approved in 2003, the management plan protects *Sargassum*, a free-floating seaweed found throughout the waters of the South Atlantic from extensive commercial harvest. *Sargassum* provides habitat to a wide variety of marine organisms including invertebrates, fish, sea turtles, and marine birds. The seaweed is familiar to offshore fishermen who look for "weed lines," or mats of floating *Sargassum* where ocean currents meet and fish such as dolphin, wahoo, billfish, and other pelagic species often gather to look for food and take shelter in the open ocean.

There are five species of sea turtles that are known to associate with *Sargassum*: Leatherback, Hawksbill, Kemp's Ridley, Green, and Loggerhead turtles. *Sargassum* found within the offshore waters of the South Atlantic region may be used by these species as post-hatchling developmental habitat, foraging habitat, and/or migratory pathways.

The shelf-edge *Oculina* coral reef, located off the central East Coast of Florida, is unique among coral reefs and exists nowhere else on earth. The area takes its name after the slow-growing ivory-tree coral, *Oculina varicosa,* which forms massive thickets supporting dense and diverse communities of finfish and invertebrates over a 90-mile strip of reefs.

In 1984, the Council established the 92-square-mile *Oculina* Bank Habitat Area of Particular Concern (HAPC) through implementation of the Coral and Coral Reefs Fishery Management Plan in order to protect the fragile coral. The *Oculina* Bank HAPC was designed to protect the area from damage caused by bottom-tending fishing gear including bottom trawls, bottom longlines, dredges, fish traps, and fish pots. Subsequent amendments to the Snapper/Grouper, Coral and Coral Reefs, and Shrimp FMPs, provided further protection to the *Oculina* HAPC through prohibitions on anchoring of fishing vessels, trawling for rock shrimp, and by requiring the use of vessel monitoring systems (VMS). Expanded in 2000, the HAPC now encompasses 300-square-miles.

Florida Keys National Marine Sanctuary, NOAA Fisheries

Ecosystem-Based Management

With the Habitat Plan as a cornerstone, the Council is moving forward to develop an ecosystem-based approach to resource management. Using input from its advisory panels, technical workshops and partners, an innovative approach is being used to address the future of marine resources in the South Atlantic region. Fishery resources depend upon healthy ecosystems, and the ecosystem-based approach cannot succeed unless efforts to curb overfishing, protect habitat, and promote and enhance research and monitoring continue.

A workshop process has been initiated to integrate and update habitat information and begin development of the Fishery Ecosystem Plan (FEP) for the South Atlantic. This will involve bringing together a core group of resource and habitat experts from cooperating federal, state, and academic institutions as well as conservation

organizations that participated directly in the development of the Council's Habitat Plan. The Habitat Plan will serve as the basis for the FEP. The workshop effort will pull together information on habitat distribution and characterization to refine EFH and EFH-HAPC designations. In addition, updated life history and status information on managed species and the characteristics of the food web they exist in will be incorporated. Ultimately, the FEP will:

- Define the geographical boundaries of the ecosystem, including characterization of its biological, chemical, and physical dynamics;
- Assess ecological, human, and institutional elements of the ecosystem;
- Develop a conceptual model of the food web;
- Describe the habitat needs of different life history stages for all managed species;
- Calculate total removals of marine biomass;
- Develop indices of ecosystem health;
- Establish long-term monitoring; and
- Develop appropriate management including catch limits, gear regulations, zoning, etc.

Evolution of the Habitat Plan into a Fishery Ecosystem Plan and transition from single species management to ecosystem-based management will require a greater understanding of the South Atlantic Bight ecosystem and the complex relationships among humans, marine life, and essential fish habitat. This effort will provide a more comprehensive understanding of the biological, social, and economic impacts of management.

Kim Iverson

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The Human Environment

Many Magnuson-Stevens Act requirements and other regulatory assessments depend on the collection and analysis of economic and social information. With this information, managers can assess the prospective costs and benefits of management measures, the impacts on small business entities, and the implications for the sustained participation of fishing communities.

While this information is key in assessing possible impacts to various sectors, it is often the most difficult to obtain. Few people are willing to disclose information regarding personal income, profit margins, and expenses for the sake of economic assessments. Information for social assessments involves time consuming qualitative and quantitative data collection regarding fishermen, their activities and their communities. Yet detailed information is needed in order for the Council to make better decisions to balance impacts and meet requirements.

Economic Considerations

Several statutes and Presidential mandates, including the Magnuson-Stevens Act, the Regulatory Flexibility Act (RFA), the Endangered Species Act, the National Environmental Policy Act (NEPA), and Executive Order 12866, require that various types of economic analyses and assessments be conducted when federal agencies propose new regulations. For example, the Small Business Administration (SBA) requires that all federal agencies determine the impact of proposed regulations on the profitability of small business entities.

Often, small businesses such as charter operations and family fishing businesses are more vulnerable to short-term losses that may occur as a direct result of management decisions. Fluctuations in a fishing operation's short-term profits can be a deciding factor in whether a boat owner is forced out of business.

The economic impact of management measures on other business sectors that provide goods and services to commercial harvesters, charter fishing businesses and private recreational fishermen must also be considered. These establishments include processing facilities, seafood markets, bait and tackle dealers, marinas, and others. Economists often use mathematical models and available data to estimate these impacts.

The dockside landings and value of commercially harvested species during 2002 in the South Atlantic region was 215,553,000 pounds worth $174,904,000. In contrast, the economic impact of marine recreational fishing in 2000 (the latest year for which information is available) included 49,817 jobs with wages of $1.4 billion and marine angler expenditures of $3.7 billion (NOAA Fisheries, 2002-2003).

Often, management decisions involve a balancing act between the immediate cost and future benefits associated with protecting sustainable fisheries as well as their habitats. Such is the case with the South Atlantic Council's efforts to sustain a viable rock shrimp fishery off the east coast of Florida while protecting the rare and fragile *Oculina* coral found in the same area. Industry leaders and fishermen involved in the specialized deepwater trawl fishery were concerned over the number of latent rock shrimp fishery permits and the number of new entrants attracted to the fishery by high prices in 2000. They came to the Council for help. Through a series of meetings with the Rock Shrimp Advisory Panel, public hearings, and industry input, a management plan was developed for the fishery. The plan established a license limitation program, addressed bycatch through gear modifications, and required Vessel Monitoring Systems (VMS) on all rock shrimp vessels fishing off the coast of Florida and Georgia. The

Location by homeport of South Atlantic charter boat permits for both snapper grouper and coastal migratory pelagic fish in the year 2002. The larger circles indicate a greater concentration of vessels. When overlaid with other permit types and businesses, potential fishing communities can be indicated.

use of electronic VMS by the fishing fleet allows fishermen to utilize bottom fishing grounds near the *Oculina* Habitat Area of Particular Concern, an area closed to all trawling to protect the *Oculina* coral habitat, while maximizing the ability to enforce illegal entry of trawlers into the closed area. Through cooperative efforts by fishermen, the South Atlantic Council, and NOAA Fisheries, the financial costs of implementing the VMS requirement were kept to a minimum and a management plan is now in place to sustain a historic fishery while protecting unique and essential coral habitat.

Recognizing the need for long-term, trip-specific data collection for economic analysis, NOAA Fisheries implemented a Cost/Earnings Data Collection Program for South Atlantic Fisheries. The study began in 2002, and involves an addition to logbook data collected from fishermen in the commercial snapper/grouper fishery and the king and Spanish mackerel fishery. Economists at NOAA Fisheries and the South Atlantic Council worked cooperatively with fishermen to develop this program. Trip-specific information such as fuel costs, grocery

costs, gear and boat expenses, revenue earned per trip and crew share is collected from fishermen participating in the survey. These expenses can fluctuate within any given year or time period due to changes in numerous factors. For example, fishery management regulations such as trip limits and closed areas have direct economic impacts on commercial fishermen. Additionally, localized fluctuations in fish abundance, changes in target species, fishing locations, gear types, technology, and market conditions have continuous impacts. An end-of-the-year survey to collect complementary fixed costs and annual expenditures will be administered as part of the program.

Better economic data will enable commercial fishermen to more effectively make their case to fisheries managers in an environment of competing interests. The Council considers several options when making a management decision, and having the right economic information will allow the Council to choose the option with the least impact on fishermen while still achieving conservation goals.

One recent example of commercial fishermen using data to their advantage involves the Tortugas Ecological Reserve near the Florida Keys. In 1998, commercial fishermen on the Tortugas 2000 working group argued that the original boundaries of the proposed reserve would be devastating to their livelihood. Fishermen were able to provide data to researchers to document the economic impacts of various closure scenarios. Managers used that information to draw boundaries that not only met conservation goals but also had less economic impact on fishermen.

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Social Considerations

With the reauthorization of the Magnuson Act, national standards were enacted that direct regional fishery management councils to consider fishing communities when implementing fishery management plans. The Councils must now "take into account the importance of fishery resources to fishing communities in order to (1) provide for the sustained participation of such communities and (2) to the extent practicable, minimize adverse economic impacts on such communities." The Council takes this mandate seriously and employs a full-time staff fishery anthropologist to address management related social issues.

The Councils and NOAA Fisheries are mandated to account for the social and economic impacts on fishing communities. However, in order to understand the potential positive and negative impacts, scientists must first be able to define just what a fishing community is and where these fishing communities are located. This is a challenge that is just beginning to be addressed in the South Atlantic region.

Demographic patterns along the South Atlantic coast have changed in the past few decades, and more and more people are relocating and settling close to the seashore (Florida and Georgia have two of the highest growth rates in the United States). Where once there were small, coastal communities, there are now new condominiums, resort hotels, marinas, and upscale shopping centers. Competition for waterfront property and access continues to drive up real estate prices and associated taxes, while pressure on natural resources

escalates. Understanding how these changes impact those who depend on the sea for recreation as well as those seeking a livelihood, is critical to preserving healthy ocean resources for all.

For the first time, a project has been completed to document the location, type, and history of fishing communities in the South Atlantic region. The Council's staff anthropologist worked collaboratively with University of Florida personnel to describe fishing communities in a broad manner (for example, whether the community is characterized mostly by commercial fishing, for-hire, recreational, or some combination of all sectors), and link on-the-ground fieldwork with the collection of as much secondary data as possible. The secondary data included U.S. Census records, landings, permits, and state information. All of this information is used to form a baseline data set to assist in the measurement of social and economic impacts — whether they are from newly proposed management measures such as marine protected areas or determining the cumulative impacts of earlier regulations.

The first phase of the Community Studies Project involved collecting broad information about communities. The second included a more in-depth study of a sample community, including detailed in-person interviews with different members of each fishing sector, compiling community histories, and the use of GIS techniques to map community natural resource use, past and present.

A study to investigate the mobility of South Atlantic commercial snapper/grouper fishermen was conducted under the auspices of the U.S. Census Bureau, NOAA Fisheries and the South Atlantic Fishery Management Council in 2001. The information gathered in the study will help the Census Bureau, and both NOAA Fisheries and Council better understand this segment of the fishery and, in turn, better respond to their particular needs.

The study reported on the very marginalized nature of fishing crews that work in the snapper/grouper

William B. Folsom, NOAA Fisheries

fishery in the South Atlantic and how this characteristic of their lives leads to a higher than average rate of mobility. The study, while small in scope, will help the Council better assess social impacts of proposed and current management measures.
Conclusions

Looking Towards the Future

A number of challenges lie ahead for the South Atlantic Council. The lack of adequate biological data to conduct stock assessments (particularly for snapper/grouper complex species) continues to be a major problem. Also, economic and social information is not available to produce the comprehensive Regulatory Impact Reviews and Social Impact Assessments that would most benefit the decision-making process. This results in imprecise management guidance and puts Council members in the unenviable position of having to make decisions affecting the fishery stocks, and individuals' lives and livelihoods, based on poor or non-existent data. Also, under these circumstances, fishermen and other constituents often do not believe or agree with the stock assessments. Even scientists may disagree with each other on the status of the stocks or the impact of regulatory measures leaving managers in a very difficult position.

Fortunately, the data limitation problem can and is being corrected. There are several initiatives currently under way that will result in the collection of more data and better data. These include implementation of the Atlantic Coast Cooperative Statistics Program (ACCSP), additional Congressional funding for the NOAA Fisheries data collection programs, and development of the SEDAR process mentioned earlier.

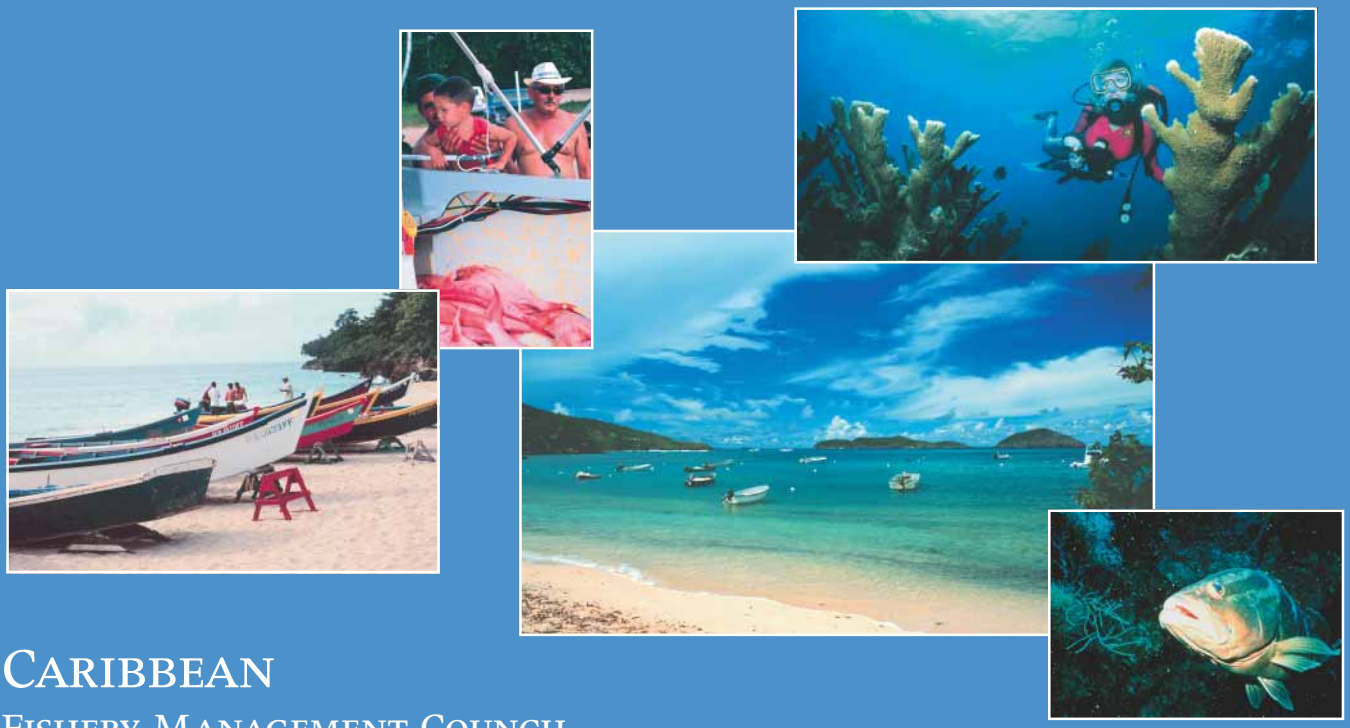
Photo courtesy Robert Freeman, Sunrise Charters

The major goal of the ACCSP is to implement coastwide standards and protocols for the way in which all Atlantic coast agencies collect, manage, and disseminate fisheries statistics. It is a cooperative state and federal data collection and data management program. The ACCSP partners are the states, NOAA Fisheries, Atlantic States Marine Fisheries Commission, U.S. Fish and Wildlife Service, and the Councils. The purpose of this partnership is to coordinate and standardize the collection, processing and storage of all marine statistics resulting in a coastwide program that is timely, credible, ensures compatibility, and eliminates duplicate reporting. This program is funded by Congress, and along with continued increased funding for NOAA Fisheries data collection programs, is being aggressively supported by the Council. The Council, in coordination and partnership with NOAA Fisheries, has also implemented the SEDAR process to formalize the stock assessments conducted on species under Council management. This process will produce more precise assessments, develop consensus among scientists, and build confidence within the fisheries constituency.

Ecosystem-based management is another major challenge the Council will face. As data collections in the Southeast are just beginning to catch up with the needs for managing individual fish stocks, meeting the multifaceted data requirements associated with ecosystem-based management seems almost insurmountable. However, it appears from legislation being considered by Congress to amend the Magnuson-Stevens Act that some form of ecosystem-based management will be the way of the future. The South Atlantic Council is being proactive and already taking action to meet this challenge.

Perhaps the Council's greatest challenge in the future will be dealing with more and more fishermen chasing too few fish. In 2002, there were an estimated 2,281,874 resident marine recreational anglers along the South Atlantic coast. There were nearly 18 million recreational saltwater fishing trips taken. Coastal populations are growing at an incredible rate. This translates into more resource users and increased pressure on marine fish stocks and the habitat that supports them. Since this influx of new entrants is primarily recreational anglers, allocation issues will continue to arise and commercial fishing activities and the communities they support will be affected.

As the Council has met the challenges of the past, it is prepared to meet the challenges of the future.



4. Caribbean
Fishery Management Council

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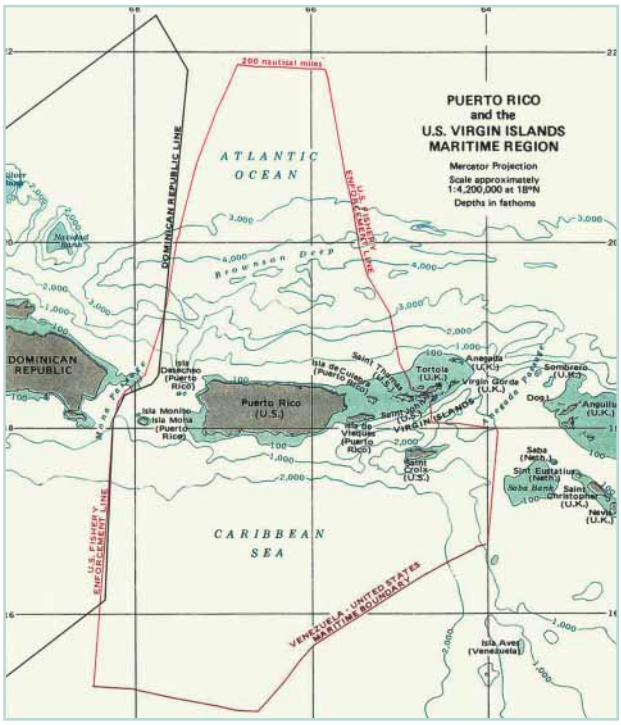
The Caribbean Fishery Management Council is one of eight regional fishery management councils established by the Magnuson-Stevens Act for the conservation and orderly utilization of the fishery resources of the United States. With its headquarters in San Juan, Puerto Rico, the Caribbean Council is unique in being the only council that does not include one of the fifty states of the Union in its management area. The Council manages fisheries in the Exclusive Economic Zone (EEZ) of the Commonwealth of Puerto Rico and the United States Virgin Islands. Many of the managed fish stocks are shared with numerous Caribbean nations.

The Caribbean Council has seven voting members and three non-voting members. Four of the voting members are appointed by the U.S. Secretary of Commerce upon recommendations of the Governors of Puerto Rico and the U.S. Virgin Islands. The other voting members are directly designated by the Act: the principal officials from Puerto Rico and the U.S Virgin Islands with marine fishery management responsibility, and the Regional Administrator for NOAA Fisheries Southeast Regional Office. The three non-voting members are: the Director of the Southeast Region of the Fish and Wildlife Service, the Commander of the Seventh District of the U.S. Coast Guard, and a representative from the U.S. Department of State.

The Caribbean Council is responsible for the creation of fishery management plans (FMPs) for fishery resources in waters off Puerto Rico and the U.S. Virgin Islands. FMPs are submitted to the U.S. Secretary of Commerce for approval and implementation. Local Governments adopt compatible legislation for the conservation of the fishery resources within local waters surrounding these islands.

(Photos above, left to right)
Fishing boats
Eyeing the catch in Puerto Rico.
Caribbean beach.
NOAA Fisheries

Staghorn corals and diver.
Nassau grouper.
OAR/NURP



Fisheries and Management Plans

In the U.S. Caribbean, one of the most successful bases for the development of fishery management plans (FMP) has been the information brought forth by the commercial fishermen with an interest in maintaining healthy fisheries. The FMP for Spiny Lobster was established in 1981, followed by the Shallow Water Reef Fish FMP in 1985. The complexity of the reef fish fisheries with a very high diversity of fish species being landed in every trip has been a major challenge for scientists and managers.

The Council manages queen conch (*Strombus gigas*) within the fishery management unit of 13 other species of mollusks; spiny lobster (*Panulirus argus*) with three other species of lobster; corals; and reef fish. There are 37 fish families managed by the Reef Fish FMP along with over 140 species of the most commonly landed fish species. The Council established in 1999 the first no-take marine reserve in federal waters, the Marine Conservation District off St. Thomas, U.S. Virgin Islands. The Marine Conservation District was established under the Coral FMP, to protect unique coral areas, but also affords protection to all fish and invertebrate species from harvest.

Recreational anglers in Puerto Rico (including out of state) made 1.4 million fishing trips in 2001. There are 230,000 recreational fishermen (shoreline and boat-based) in the U.S. Caribbean. There are over 50,000 recreational vessels registered in Puerto Rico and over 3,000 recreational vessels registered in the U.S. Virgin Islands.

Queen Conch

The Council had proposed the closure of the fishery prior to disapproval of the amendment to the FMPs submitted to comply with the Sustainable Fisheries Act requirements. On hold since 2002, the efforts to rebuild the fishery include developing a Geographical Information System (GIS) for queen conch, based on the information provided by the queen conch commercial fishermen. The GIS has been developed by the Department of Geography of the University of Puerto Rico using data from the SEAMAP-Caribbean fishery independent NOAA fisheries program, which is run through the Puerto Rico Department of Natural and Environmental Resources and the Department of Planning and Natural Resources of the U.S. Virgin Islands. This information has been crossed referenced to the habitat maps developed by NOAA Fisheries. This work is being done to identify potential protected areas as nursery grounds for queen conch.

At present there are size limits in place, as well as seasonal closures to protect egg-laying conch in both state and federal waters. Additional work on potential nursing areas includes the no-take marine reserve of Culebra, Puerto Rico that has been assessed for queen conch and reef fish. These baseline data collections will serve to monitor changes in fish populations as compared to open fishing areas.

International efforts have been pioneered by the Council to establish compatible management strategies in the region. The International Queen Conch Initiative was developed in 1996, and continues to promote pan-Caribbean management and monitoring of queen conch.

NOAA Fisheries

Spiny Lobster

The spiny lobster fishery has been under management since 1981, with compatible regulations of size limits and the banning of taking egg-bearing females throughout the state and federal jurisdictions. The percent of undersized spiny lobsters taken commercially has continuously declined to less than 20%. The spiny lobster fishery is currently under assessment.

Reef Fish

The grouper and snapper fisheries are the most important fisheries in the U.S. Caribbean. These species are most vulnerable during their spawning aggregations, which are very site and time specific; they occur every year during the same months, moons and at the same sites. These aggregations are easy targets for commercial and recreational fishermen. Recreational fishing for reef fish accounts for almost as much as the harvest in the commercial fishery.

The Council has used seasonal area closures to protect these species and have found this management strategy to be the most effective. These have been developed in cooperation with the local fishermen and governments. The Council has also prohibited the take of two groupers from the EEZ, the Nassau grouper and the goliath grouper, in hopes of rebuilding their populations.

Coral

The Council prohibited the take of all coral, dead or alive, and live-rock since 1995. Fisheries in the Caribbean are coral reef based fisheries, both in shallow and deep waters. The corals were protected because of their important role in the sustainability of commercial and recreational fisheries. The increased harvest of reef fish organisms throughout the world for the aquarium trade was a primary concern to the Council. The area is known for a high diversity of fish and invertebrate species highly sought by aquarists. The Council had already protected butterfly fish and seahorse from harvest by prohibiting their take from the EEZ. In addition, juveniles of red hind (small grouper of commercial importance) and mutton snapper were also protected from the trade by prohibiting their harvest for this purpose.

The Council is currently involved in the mapping and assessment of coral reefs in the EEZ. These deep water reef-forming corals have not been described in any detail, but some areas show very healthy corals and depths of over 180 feet. A GIS will be prepared from the historical information on deepwater coral reefs.

Erik Zobrist, NOAA Restoration Center

Two divers work to reattach a large fragment of Elkhorn coral as part of the Mona Island Coral Reef Restoration Project.

NOAA Fisheries

Issues

Bycatch

Because of the artisanal matters of the U.S. Caribbean fisheries, most of the fish captured are landed and sold, or kept for personal use. However, the Council will be seeking the establishment of a program to achieve standardization of bycatch reporting of the commercial fisheries included in the Council FMPs. The Council will be cooperating with local agencies to estimate bycatch especially when commercial fishermen will be involved in these efforts.

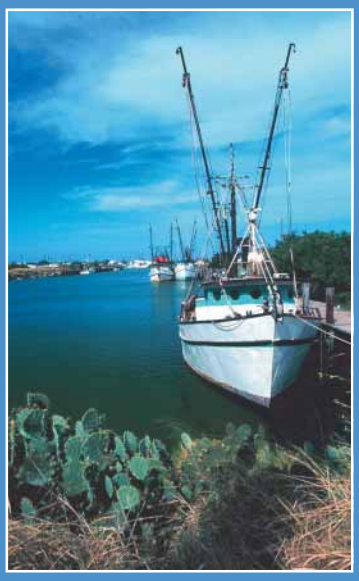
Essential Fish Habitat

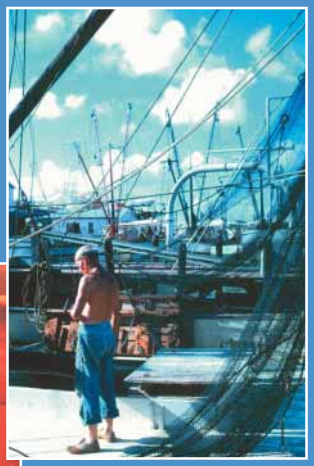
The Council, in collaboration with the Woods Hole Oceanographic Institute, the University of Puerto Rico, and other local and federal agencies, has begun to identify species composition of the deepwater reef-forming corals in the EEZ using high-resolution digital photos, which allows for identification of the deepwater reefs. The preliminary results show an incredible diversity of species in healthy coral reef communities that are worth preserving for future generations.

The Council has also contracted to map and obtain high-resolution bathymetry through side scan sonar and multi-beam of the Marine Conservation District no-take zone, established in 1999, off St. Thomas and the deepwater seasonally closed areas of St. Croix. These areas are fish spawning aggregation sites for groupers, snappers, and other fish species. Mapping of these deepwater habitats in the EEZ is a high priority in the efforts of the Council to identify and describe essential fish habitat. In addition, the Council will be funding a new project on coral reefs. This will produce an inventory and atlas of corals and coral reefs, with emphasis on deepwater coral reefs within the U.S. Caribbean EEZ. This project was approved as part of the NOAA Coral Reef Program, which funded the Councils that have coral and coral reefs under their area of authority.

NOAA Fisheries

Nassau grouper.





5. Gulf of Mexico
Fishery Management Council

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The Gulf of Mexico is a unique ecosystem shared by Mexico and the five Gulf states: Florida, Alabama, Mississippi, Louisiana, and Texas. It is a semi-enclosed water basin that includes tropical ecosystems in Mexico, and off southern Florida where coral reef ecosystems and fauna of the Caribbean Sea dominate. The northern U.S. Gulf supports largely temperate estuarine-dependent ecosystems. About half of all wetlands in the United States occur in the northern Gulf. The northern Gulf is characterized by a broad continental shelf east and west of the Mississippi River which extend to sea more than 120 miles. The shoreline of the northern Gulf is about 1,630 miles.

The Gulf is unique in that it receives discharge from two of the largest rivers in the United States. The Mississippi/Atachafalaya Rivers discharge about 420 billion gallons of water per day and historically have deposited about 450 million metric tons of suspended sediment annually. Since the 1950s, a number of reservoirs have been built on the Missouri and Arkansas Rivers, which reduced this sediment load by about half. The channelization of the Mississippi River by dikes has prevented the river from creating new estuarine marsh lands and contributes to subsidence of coastal lands both of which result in continuous declines in estuarine marsh lands. However, the dikes were necessary to prevent annual flooding of land adjacent to the Mississippi River. The U.S. Army Corps of Engineers (COE) has created several controlled river flow diversions that are creating new estuarine wetlands from the sediment.

Overall, this river discharge of water and sediment, along with other river discharges has created a series of nutrient-rich estuarine ecosystems, along the northern Gulf.

(Photos above, left to right)
Shrimp trawler.
William B. Folsom, NOAA Fisheries

Biloxi, Mississippi.
Mary Hollinger, NESDIS/NODC

Fishing off Sanibel Island.
Shrimp fisherman.
NOAA Fisheries

Lauri Lawson, NOAA Fisheries

These areas are very productive, and provide valuable marine resources to the region. About 700 species of finfish and invertebrates are harvested from state and federal waters of U.S. waters of the Gulf of Mexico. These have an economic value commercially of $800 million dockside and generate about $5.6 billion in recreational expenditures.

The marine resources in the region are cooperatively managed by the coastal states and the Gulf of Mexico Fishery Management Council. The Council was established by the Magnuson-Stevens Fishery Conservation and Management Act in 1996 to manage fisheries in the 200-mile Exclusive Economic Zone (EEZ). The Gulf Council consists of representatives from the states of Florida, Alabama, Mississippi, Louisiana, and Texas. There are 17 voting members on the Council, representing state and federal agencies, and public members knowledgeable about the fisheries. In addition, there are several non-voting members on the Council, representing other government agencies.

Fisheries and Management Plans

The Council manages 69 fish and invertebrate stocks through 6 fishery management plans (FMPs) and about 330 species of corals in the Coral FMP. Most of these stocks are predominantly harvested from the federal waters, although some are estuarine dependent. In addition to corals, the Council manages three crustacean fisheries for shrimp, spiny lobster, and stone crabs, and three finfish fisheries for coastal migratory pelagics, red drum, and reef fish. Highly migratory species (billfish, swordfish, tunas, and sharks) in the Atlantic Ocean, including the Gulf of Mexico, are managed by NOAA Fisheries under the Magnuson-Stevens Act.

Major stocks managed by the states include 300 species of marine life organisms harvested from the Florida coral reef ecosystem for the marine aquarium trade. In terms of biomass, the major stock managed by the states is the Gulf menhaden fishery. That stock, in the early 1980s, produced about 2 billion pounds annually. In recent years the processing and fishing capacity has been down-sized by the industry and typically annual landings are about 1.3 billion pounds.

Coral and Coral Reef Resources

During the late 1970s, the Council became aware of persons using explosives to remove coral from a shipwreck. Because there was no federal entity that could regulate the taking of coral throughout the EEZ, the Gulf Council jointly developed a FMP with the South Atlantic Council. The FMP included about 330 species of coral in the classes Hydrozoa and Anthozoa. The FMP, which was implemented in 1984, prohibited all harvest (or possession) of stony coral and seafans except by scientific permit.

Amendment 1, implemented in 1990, allowed the harvest of up to 50,000 colonies of gorgonians (octocorals) for the aquarium trade from the Gulf and South Atlantic areas. The harvest was largely from the patch reefs in the Florida coral reef tract. The population of gorgonians on these patch reefs was estimated by FMRI at about 4.7 billion colonies.

In the early 1990s, the harvest of 'live rock' off west Florida in the Gulf escalated, annually reaching nearly 500,000 pounds in 1994. Live rock is coral reef rubble that has marine organisms living on it such as anemones, sponges, tube worms, bryozoans, and algae. Not only does live rock enhance the beauty of marine aquariums, but it also moderates the pH of the water since it is calcareous. However, because live rock is habitat for a large assemblage of organisms, the two Councils decided to phase-out the harvest of "wild" live rock and require the aquaculture of live rock. This was done through Coral Amendments 2 and 3

implemented in 1994 and 1995, respectively. Coral Amendment 2 also provided that, in the future, the Gulf and South Atlantic Councils would manage coral and coral reef resources separately through separate FMPs.

The aquaculture of live rock is closely regulated. Leases for bottom areas must be obtained from the state of Florida or through the Corps of Engineers (COE). The bottom areas designated for culture are limited in size to 1 acre. The participants are permitted by NOAA Fisheries, under whose direction they were allowed to place limestone substrate on the bottom areas for several years while the substrate became inhabited by marine organisms. The harvest of the substrate populated by organisms for the aquarium market is monitored by NOAA Fisheries, to insure that "wild" live rock was not included. Currently, there are 155 permitted live rock aquaculture areas in the Gulf.

The Coral FMP established three habitat areas of particular concern (HAPCs) to protect pristine coral areas in the Gulf and South Atlantic. The HAPCs in the Gulf included the Middle Grounds off Florida and the Flower Garden Banks off Texas (*Figure 1*). The Florida Middle Grounds area, which totals 348 square nautical miles, is predominantly covered with soft coral (gorgonians). It supports a large assemblage of fishes associated with live bottom. The FMP prohibited the use of any fishing gear interfacing with the bottom within the boundaries of the HAPCs.

GMFMC

Figure 1

The harvest prohibitions applied to the EEZ have been effective in maintaining the coral and coral reef resources in relatively undamaged condition. The protection provided by designating areas as HAPCs has apparently been very effective judging by the ongoing survey of the Florida Middle Grounds. A recent comparison of videos taken in 1976 and 2003 of the same benthic areas on the Middle Grounds indicate that the areas have essentially the same in flora and fauna cover, with very little evidence of gear damage. However, in state waters or the nearshore EEZ, some reef complexes may be adversely affected by human touch and inadvertent breaking by snorkelers and divers. Additionally, some reefs have been subject to bleaching and other diseases in recent years, possibly due to global warming.

A major pristine, deep-water reef, Pulley's Ridge is being classified as an HAPC. Pulley's Ridge is about 1,200 square nautical miles and represents the northern extent of coral reef species more characteristic of the Caribbean Sea. Funding available to the Council from the Coral Reef Conservation Grant is allowing ongoing research annually to describe and map coral reef resources in the Gulf. Currently, that includes Pulley's Ridge, Florida Middle Grounds, Madison/Swanson Marine Reserve, and the Sonnier Bank off Texas. There are a number of coraline sea-mount pinnacles off Texas that may be surveyed in coming years for suitability as HAPCs.

Stone Crab Fishery

The commercial stone crab fishery occurs off the Florida Keys and Florida's west coast. It has been an expanding fishery both northward and offshore for 20 years. Only in the past 6 years has this fishery appeared to reach the maximum sustainable yield (MSY) level of about 3.0 to 3.5 million pounds of claws. It, like the other crustacean fisheries has never been recruitment overfished. The minimum size limit for claws, originally set by the state, allows the females to spawn two years before being vulnerable to harvest. Only the claws are harvested and some declawed crabs, returned to the water, regenerate claws that are harvestable in subsequent years.

The Stone Crab FMP manages the commercial fishery for *Menippe mercenaria* and *M. adina* cooperatively with the state of Florida. The FMP was implemented in 1979 to resolve a major gear conflict between shrimp fishermen and crab fishermen, in which gunfire by both parties occurred. In 1978, the U.S. Coast Guard (USCG) temporarily resolved this conflict and negotiated a temporary solution by establishing a seasonal line of separation between the two industries that extended from off Naples, Florida to the Keys. Having resolved the conflict the USCG concluded it did not have the authority to implement a permanent solution. Therefore, the Council, with the assistance of the state and the advisory panels for shrimp and stone crab negotiated a permanent solution between the two industries.

The Southwest Florida Seasonal Closure of federal and state waters was established to resolve a gear conflict between stone crab fishermen who fished during daylight and shrimp fishermen who fished at night. The area is closed to shrimping from November 1 through May 20 inshore of the line to protect juvenile stone crab and prevent loss of stone crab traps in trawls. According to the shrimp fishermen negotiating the resolution of this conflict, only about 10% of the bottom inshore of the line was trawlable. This solution remains in place today.

In addition to establishing this gear closure, the FMP also implemented the other state rules regulating the fishery in the EEZ. In addition to the minimum claw size of 70 mm propodus length, the rules required that declawed crabs be returned to the water alive, a spawning season closure, a prohibition on harvest of egg-bearing females, and escapement panels in the traps.

In 1983 another serious gear conflict occurred between shrimp fishermen and crab fishermen off Hernando and Citrus counties near the city of Crystal River. Advisory panels established by the state and the Council negotiated a zoning solution to that conflict. The Central Florida Shrimp/Stone Crab Separation Zones were closed to either shrimping or crabbing from October 5 to May 20. Crab or shrimp fishing alternated in zones IV and V, with zones I and III permanently closed to shrimping. This solution, which remains in place today, was implemented by Amendment 2 in 1984.

Amendment 4 (1991) implemented a scientific definition of overfishing and an action plan to arrest overfishing should it occur as required by the 50 CFR 602

NOAA Fisheries

Stone crab fisherman.

guidelines. In 1999, the Council and state concluded that the fishery was greatly overcapitalized. Unlike the spiny lobster fishery, the overcapitalization in the stone crab fishery apparently caused no mortality to juveniles which are able to enter and leave traps at will. However, this overcapitalization adversely affected the fishermen and, under some conditions, the environment. Therefore, the state of Florida and the Council began developing trap limitation programs that, over time, will reduce the number of traps to the optimum level needed to harvest the resource. The state program was implemented in 2001 and the federal program was implemented by Stone Crab Amendment 7 in 2002. The trap certificates used in the trap limitation program are reduced in number each time certificates are traded. Each time transfer of certificates occurs, the value in terms of certificates is discounted by 25%. This percent declines to 10% as the target of 600,000 traps is approached (about a reduction of 60%). The stock is classified by NOAA Fisheries as neither overfished or subject to overfishing, i.e., the stock biomass is above that needed to produce MSY annually.

Spiny Lobster Fishery

The state of Florida requested that the Councils develop a FMP for the fishery because vessels based in the Gulf and Atlantic states other than Florida were illegally harvesting spiny lobster from Florida waters and landing them in home states. Based on this request and the fact that a significant portion of landings were from the EEZ, the Gulf and South Atlantic Councils, cooperatively developed the FMP with the state. Prior to the implementation of the Magnuson-Stevens Act, Florida fishermen based in Southeast Florida ports participated in a distant water fishery in the Bahamian Islands. After passage of the Act, the Bahamian government banned U.S. vessels from fishing for lobster in their waters. Most of these fishermen redeployed their gear in the Florida fishery, which probably reduced CPUE for each fisherman.

The FMP, implemented in 1982, provided for management of the spiny lobster, *Panulirus argus*, and slipper lobster, *Scyilarides nodifer*. Commercial harvest of

GMFMC

slipper lobster was largely taken incidentally by shrimp trawls and sometimes both lobster species were directly targeted with trawls. Commercial harvest of spiny lobster was by traps and diving. Recreational harvest of spiny lobster was by diving. The state rules regulating the fishery were implemented in the EEZ by the FMP. The principal rules included a spiny lobster minimum size of 3-inch carapace length (or 5.5-inch tail length) which yields 94% of the maximum yield per recruit (YPR) from the stock. The rules also provided for a spawning season closure, trap construction criteria, escape panels, and limitation on the number of sublegal size lobster that could be possessed as attractants.

The commercial spiny lobster fishery occurs almost entirely in the Florida Keys area. Lobster, like shrimp, has not been recruitment overfished, but annual production was adversely affected by the practice of using live, undersize lobsters as attractants in traps as they were redeployed in the fishery. Amendment 1, in 1987, eliminated most of the mortality on undersize lobster by requiring that lobsters be held in aerated live wells while on board vessels. It also required recreational and commercial divers to measure and release undersize lobsters while in the water, rather than boating them first. However, because the industry was overcapitalized in terms of the number of traps deployed, the industry practice of trying to bait all these traps with undersize lobsters as attractants still resulted in some unnecessary mortality.

Amendment 3, implemented in 1991, provided a scientific definition of overfishing and an action plan to arrest overfishing should it occur as required by 50 CFR 602 guidelines. The state of Florida and the

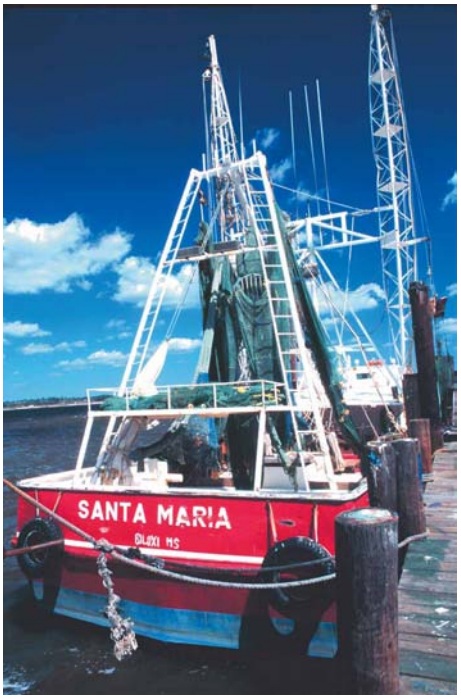
Councils implemented a trap limitation or trap certificate program designed to reduce, over time, the number of traps deployed in the fishery (1992 Spiny Lobster Regulatory Amendment).

The requirement for live wells, coupled with the trap certificate reduction program has significantly reduced the handling mortality associated with the practice of using sublegal lobster as attractants. The number of traps has declined from 800,000 to about 500,000. Because of these actions, the equilibrium yield has increased to provide annual landing levels of 6 to 7 million pounds for the commercial sector (the recreational sector has annually landed about 1 million lobster from the Florida Keys). The stock has not been recruitment overfished and growth overfishing of sublegal lobster has been significantly reduced. The equilibrium yields should continue to increase and the overcapitalization in number of traps should continue to decline as trap numbers are reduced to the optimum level, i.e., about 370,000.

Currently, NOAA Fisheries classifies the spiny lobster stock as neither overfished or subject to overfishing. However, some growth overfishing continues to occur from sublegal size lobster mortality.

Shrimp Fishery

The Shrimp FMP, which was implemented in 1981, was developed largely at the request of the states of Texas and Florida. Florida had established a shrimp nursery area (Tortugas Shrimp Sanctuary) in Southeast Florida for the pink shrimp fishery. The sanctuary has been closed to shrimp trawls for more than 30 years, and much of the bottom is covered with live bottom organisms (sponges, algae, etc.). Not only is it an important nursery for pink shrimp, but also for larvae of the spiny lobster as they settle out from their planktonic state. The boundaries of the Tortugas Shrimp Sanctuary were specified by the University of Miami based on achieving the count size of 47 (whole weight) that maximized shrimp YPR. However, a portion of the boundary extended beyond the state fishery jurisdiction of nine nautical miles. Captains on out-of-state vessels took advantage of this and began shrimping in that portion of the sanctuary. A federal court ruled Florida could only enforce that portion of the boundary for vessels registered in Florida. Therefore, the state requested that the Council establish the Tortugas Shrimp Sanctuary under a FMP. The FMP permanently closed this 3,652 square nautical mile area to use of trawls and harvest or possession of shrimp.



William B. Folsom, NOAA Fisheries

Shrimp trawler based at Biloxi, Mississppi. Note the Turtle Excluder Devices (TEDS) in the nets.

The state of Texas annually closed its 9 nautical mile jurisdiction for a 45 to 60-day period to allow the brown shrimp to grow to a 39 count (whole weight). Because that fishery was largely conducted at night there was a lot of incursion of vessels into the closed area. Therefore, the state of Texas requested that the Council include a cooperative shrimp closure in the FMP so there would be a buffer zone in the EEZ. Within the Cooperative Texas Shrimp Closure area, which totals 5,475 square nautical miles, shrimping is prohibited for 45 to 60 days out to either 15 or 200 miles (*Figure 1*). To enhance enforceability by aircraft, the closure usually extends 200 miles offshore. The benefits to the shrimping industry of the closure have been documented annually since 1981.

Lauri Lawson, NOAA Fisheries

Prior to the Magnuson-Stevens Act, some U.S. shrimp vessels actively fished off Mexico. In the period 1970 - 1974, about 99% of the catch, or about 9.5 million pounds, from Mexican waters was landed in Florida and Texas. Immediately, on implementation of a 200-mile economic zone in 1976 by Mexico, that fishery was closed to U.S. vessels. The vessels in that fishery redeployed to the U.S. shrimp fishery.

The Shrimp FMP provided for management of major penaeid shrimp, including brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), and pink shrimp (*F. duorarum*). The FMP also managed the minor stock of royal red shrimp (*Hymenopenaeus robustus*), which is a deep-water species found in waters of 140 to 300 fathoms. However, the principal goal of the FMP is to maximize YPR for the penaeid shrimp in the Texas and Florida fisheries. The Louisiana shrimp fishery principally targeted much smaller brown shrimp for their markets, which included canned shrimp.

The Gulf of Mexico penaeid shrimp fishery is one of the nation's largest and most valuable fisheries. The three species of penaeid shrimp comprise more than 99% of landings of species managed by the Council. In recent years landings have averaged about 240 million pounds (whole weight) with an estimated annual dockside value of $500 million. Because a large portion of the shrimp is consumed in restaurants, the value to the U.S. economy of Gulf shrimp is many times higher.

All the major shrimp species are essentially annual crops with few individuals living as long as 18 months. Therefore, for the 43 years that records are available for brown and white shrimp and for the 30 years that records are available for pink shrimp, none of these stocks has been recruitment overfished. However, in as much as the size that optimizes yield per recruit for brown and white shrimp is 39 count (whole weight), growth overfishing of these stocks has occurred in the Louisiana fishery where the industry is geared to processing of small shrimp. The MSY is highly variable annually dependent on the environmental conditions in the estuaries. The fishery was highly overcapitalized in terms of number of vessels.

Amendment 5, implemented in 1991, provided a scientific definition of overfishing for penaeid shrimp as required by the 50 CFR 602 guidelines. These definitions and other status determination criteria are being updated by Amendment 13 (pending implementation) to comply with the Sustainable Fisheries Act.

Significant reductions in bycatch have occurred in the Gulf of Mexico shrimp trawl fishery since the mid-1970s. During that period NOAA Fisheries estimated that the trawl fleet was discarding about 300,000 metric tons of finfish and invertebrate bycatch — a ratio of bycatch to shrimp poundage of about 10:1. In 1995 NOAA Fisheries estimated the average ratio of bycatch to shrimp was reduced to about 4:1 by the mid-1990s. The credit for these reductions goes largely to industry actions to modify gear, and also partly to a requirement that all shrimp vessels use trawls equipped with turtle excluder devices. A rebuilding plan for red snapper required further reductions in trawl bycatch. Beginning in 1998, the Gulf Council, through Shrimp Amendment 9, required the use of bycatch reduction devices (BRDs) in trawls used in the central and western Gulf to achieve at least a 44% reduction in fishing mortality of juvenile red snapper. In 2002, the Council took action through Shrimp Amendment 10 to extend the BRD requirement to the eastern Gulf. Currently, BRD designs are estimated to reduce the bycatch of juvenile red snapper by about 50%, while the bycatch of other finfish species such as croaker and spot has been reduced by more than half from previous levels.

NOAA Fisheries

Sportfishing for king mackerel.

The states of Florida and Texas, which have nine nautical mile fishery jurisdictions, also require BRDs.

Shrimp Amendment 11, implemented in 2002, required all shrimp vessels fishing the EEZ to have commercial permits. Shrimp Amendment 14 (under development) includes alternatives for a limited access program for that fishery. This program is anticipated to remove most of the excess fishing capacity in the fishery.

Coastal Migratory Pelagics (CMP) Fishery

The Gulf and South Atlantic Councils jointly developed the FMP for coastal migratory pelagics because the range of some stocks included the jurisdictions of both councils, or portions thereof. The three major species are included in the management unit subject to regulation. These include king mackerel, (*Scomberomorus cavalla*), Spanish mackerel (*S. maculatus*), cobia (*Rachycentron canadum*). Four minor species are included in the FMP for data collection purposes only. These include cero (*S. regalus*), little tunny (*Eutbynnus alletteratus*), dolphin (fish) (*Coryphaena hipparus*), and bluefish (Gulf only) (*Pomatomus saltatrix*). Additionally, It should be noted that the South Atlantic Council has developed a separate FMP for dolphin and wahoo for the Atlantic coast. The Gulf Council is considering including wahoo (for Gulf only) in the Coastal Migratory Pelagics FMP.

The Councils' FMP for coastal migratory pelagics was implemented in 1983. At that time, the scientific opinion was that the king and Spanish mackerels were single stocks ranging from the western Gulf through the mid-Atlantic/New England areas. In 1985, assessment information became available that indicated there were separate migratory groups of king mackerel for the Gulf and Atlantic areas with a mixing zone off the southeast Florida coast. This information indicated the Gulf migratory group of king mackerel were severely overfished, whereas, the information in Draft Amendment 1 indicated only a moderate reduction of total allowable catch (TAC) to ten million pounds was necessary to prevent exceeding MSY. The Council, in October 1985, requested that NOAA Fisheries implement an emergency rule to reduce TAC for Gulf-group king mackerel from 14.4 to 5.2 million pounds. The rule was implemented in March, 1986. In 1986 the Council, by regulatory amendment, reduced this TAC to 2.9 million pounds; and in 1987, by regulatory amendment, to 2.2 million pounds. Thus, the restoration program for Gulf-group king mackerel began. Both commercial and recreational fisheries were closed when the quota for that sector was reached. Throughout the 1990s the Gulf group king mackerel stock continued to increase in size. By 2000, the Council's Mackerel Stock Assessment Panel concluded that the stock was no longer undergoing overfishing. Based on new status determination criteria using a precautionary approach, the Assessment Panel concluded in 2001 and again in 2002 that Gulf group king mackerel were no longer undergoing overfishing and were no longer overfished, although some continued rebuilding of B_{MSY} was needed to increase stock size to the level that would exceed MSY.

Gulf-group Spanish mackerel was also classified as overfished and undergoing overfishing from the late 1980s to the early 1990s. Similar regulatory reductions were applied to Gulf-group Spanish mackerel. Over the ensuing years, the TACs were gradually raised and the Spanish mackerel stock was considered rebuilt above MSY level by 1994. As with the king mackerel stock, these extended rebuilding periods were structured to minimize adverse economic affects on recreational and commercial industries and fishing communities. The other major stock (cobia) in the CMP complex was not classified as overfished nor is overfishing occurring (2002 NMFS Report to Congress on Status of Fisheries of the U.S.). We, therefore, feel management of these stocks are examples of fishery management successes.

Amendment 1, implemented in 1985, included a framework procedure for specifying TAC for the major coastal migratory pelagic stocks. It also established commercial vessel permits. Amendment 3, implemented in 1990 prohibited use of drift gill nets and purse seines in the fishery. Amendment 5, implemented in 1990, provided a scientific definition of overfishing and the framework procedure for arresting overfishing as required by the 50 CFR 602 guidelines. (These definitions were revised and the status determination criteria specified, as provided by the SFA through a regulatory amendment submitted to NOAA Fisheries for implementation in 2003). Amendment 6, implemented in 1992, provided a rebuilding plan for the mackerel stocks. Amendment 8, implemented in 1997, provides a moratorium on the issuance of additional commercial vessel permits for king mackerel. The Council is drafting a generic amendment for mackerel and reef fish fisheries that includes limited access programs.

Red Drum Fishery

In the early to mid-1980s a purse seine fishery developed for the offshore spawning stock of red drum (*Sciaenops ocellatus*). Previously, these large fish had not been directly targeted because smaller fish from the estuaries commanded a higher price. Apparently, the demand for red drum was enhanced by the development of a recipe for "blackened" redfish by a famous New Orleans chef. Commercial landings from the Gulf EEZ increased from about 80,000 pounds in 1979 to 8 million pounds in 1986, which, coupled with increased landings from state waters, resulted in total commercial landings of 13.5 million pounds in 1986. Because of escalating concern over this increase in landings by the fishery constituents, the Merchant Marine Subcommittee of the U.S. House of Representatives held a fact-finding meeting in New Orleans in 1985. As a result of that meeting, NOAA Fisheries initiated development of a FMP that was implemented in 1986.

Based on analyses in the FMP, NOAA Fisheries concluded the stock was overfished and overfishing was occurring. Therefore, the TAC for the Gulf EEZ was set at 625,000 pounds for a bycatch allowance of 325,000 for the recreational sector and 300,000 for the commercial sector.

Amendment 1, developed by the Council and implemented in 1987, prohibited any harvest from the EEZ off Florida and Texas because long-term data on the average size of fish in these recreational fisheries indicated the stock was being growth-overfished. The amendment also recommended the states adjust their regulations to reduce overfishing, so that at least 20% of each cohort or year-class survive the state fishery to migrate to the offshore spawning stock. The 1987 stock assessment by NOAA Fisheries SEFSC concluded that the average fishing mortality on the early year classes would result in escapement rates of less than 2%. This would not maintain the spawning stock biomass above the overfished threshold (20% spawning stock biomass per recruit). In 1988, Amendment 2 prohibited harvest or possession of red drum from the EEZ, and requested that the states adjust their fishing rules to allow 30% escapement of each year-class from the state fishery to the offshore spawning stock.

All of the states implemented very restrictive fishing regulations to conserve red drum. Florida probably implemented the most restrictive rules. They went from no commercial quota, no bag limit and a 18-inch size limit to a prohibition on sale, a bag limit of one fish between 18 and 27 inches in length, and a closed season in March through May. All the states, except Mississippi, prohibited sale of red drum. Mississippi set a commercial quota of 200,000 pounds (subsequently reduced to 35,000 pounds).

At the 1991 Red Drum Stock Assessment Panel (RDSAP) meeting, a new NOAA Fisheries assessment was reviewed. Representatives of Louisiana and Florida also presented assessments that indicated the average escapement rate for each year-class in their state was about 70% and 65%, respectively. Other state representatives felt their state was also achieving at least the 30% escapement rate, but offered no analyses to support that contention.

T. Potts, OAR/NURP

Gag grouper.

The stock continued to be considered overfished by the RDSAP at their meetings to review new NOAA Fisheries assessments in 1993 and 1996. The NOAA Fisheries 1999 assessment indicated that the stock was overfished and overfishing was occurring. However, differing results were presented at the 1999 RDSAP meeting by Louisiana, Florida, and Texas from the 1998 and 1999 assessments. Also, the NOAA Fisheries analyst expressed a low confidence in the conclusion of his assessment. Faced with these uncertainties the RDSAP deferred any conclusion and further discussion to the next assessment.

The NOAA Fisheries revision of the assessment for 2000 also was not conclusive on the status of the stock. The principal assessment scenarios suggested the stock was still overfished and subject to overfishing, whereas two other scenarios suggested that neither was occurring. One such scenario was based on assuming that the selectivity in the fishery was the same for age 1 and age 2 fish. The other scenario was based on assuming the 1986 tag/recapture study correctly measured the offshore standing stock. Research had been undertaken by NMFS in 1999 to complete a new tag/recapture study to estimate the size of the offshore standing stock and for an aerial survey of geographical distribution of that standing stock. These were to be used to tune the assessment models. Unfortunately, neither of these studies were successfully completed.

Reef Fish Fishery

The Reef Fish FMP was implemented in 1984. In addition to a minimum size limit for red snapper, the FMP prohibited the use of fish traps, roller or rock-hopper trawls and powerheads for harvest of reef fish in the nearshore EEZ (inshore of 10 to 20 fathoms). This prohibited area was called the Stressed Area (*Table 1*). At the time the FMP was implemented there were no data analyses conducted by which the condition of the reef fish stocks could be determined. A stock assessment prepared by NOAA Fisheries in 1988 indicated that the red snapper stock was overfished (i.e., <20% spawning stock biomass per recruit) and that the harvest of juvenile red snapper by shrimp trawls was contributing to this overfished condition. Furthermore, a reduction in shrimp trawl bycatch would be necessary to restore the stock. This stock assessment was partly the basis for development of Amendment 1 which initiated the rebuilding program for red snapper in 1990 by regulating the directed commercial and recreational red snapper fisheries. Many of the reef fish amendments and most of the regulatory amendments from 1990 to 2000 are actions related to the Council's red snapper rebuilding program.

In 1991, NOAA Fisheries responded to the 1990 amendments of the MSFCMA by implementing a multi-year research program authorized by Section 405 to assess the effects of shrimp trawl bycatch on fishery stocks of the Gulf and South Atlantic and to develop gear to reduce such bycatch. The results of these studies were reported by NOAA Fisheries to Congress in 1995.

Amendment 1, which was implemented in 1990, not only initiated a rebuilding plan for red snapper, but it also specified a threshold for judging whether reef fish stocks were overfished or subject to overfishing. It also included a framework procedure for specifying TAC based on a stock assessment prepared by NOAA Fisheries. This framework required the Council to set TAC within the range of acceptable biological catch recommended by the Council's scientific stock assessment panel (SAP). Amendment 1 also prohibited harvest by bottom longlines inshore of 20 fathoms off the Florida shelf and inshore of 50 fathoms from the Florida panhandle through Texas. The 50-fathom prohibition prevented longlines from targeting the red snapper spawning stock. Commercial annual quotas for deep-water and shallow-water grouper were also established.

In 1992, Amendments 4 and 8 implemented the following measures: a moratorium on issuance of additional reef fish vessel commercial permits, a limited

access system for commercial red snapper vessels (through an endorsement system), and a closed spawning aggregation site for mutton snapper. In 1995 Amendments 8 and 9 implemented an individual transferable quota (ITQ) for the red snapper commercial fishery, which was repealed by the Sustainable Fisheries Act. In 1996 Amendment 15 created a two-tiered commercial license limitation program to replace the ITQ system.

Five reef fish stocks under the Council's jurisdiction are considered overfished, including two minor stocks, goliath grouper and Nassau grouper. The Council acted proactively to protect these two stocks by prohibiting the harvest or possession of these species beginning in 1990 and 1997, respectively. Rebuilding plans for the five overfished stocks (including vermilion and red snappers and greater amberjack) have been (or will be) developed and submitted to NOAA Fisheries for implementation. A recent stock assessment indicates that red grouper, considered overfished in 1999, are no longer overfished. Overfishing is occurring in three major stocks of reef fish including red snapper, vermilion snapper and red grouper. Gag, a major grouper species, was classified as undergoing overfishing in 1999. In 2000, the Council implemented rules that arrested overfishing of the stock. During 2001 and 2002, the Council developed an extensive rebuilding plan for red grouper, which was classified as both overfished and undergoing overfishing, based on a 1999 stock assessment. This rebuilding plan required about a 45% reduction in landings and included a proposed action to prohibit longline vessels from fishing inshore of 50 fathoms. A 2002 stock assessment indicated a significant improvement in the status of the red grouper, i.e., no longer overfished. Nevetheless, a Secretarial Amendment reducing harvest by 10% to arrest overfishing is being developed by NOAA Fisheries.

Due to the concern over the status of the greater amberjack stock, the Council took precautionary action to reduce landings by reducing the recreational bag limit to one fish in 1997, and prohibiting commercial landings for a three-month period each year beginning in 1998. Secretarial Amendment 2 to the FMP, approved by NOAA Fisheries in 2003, establishes a rebuilding plan for seven years.

A 1999 regulatory amendment established two no-take marine reserves on spawning aggregation sites for gag grouper. These were the Madison/Swanson and Steamboat Lumps Marine Reserves (*Figure 1*). All fishing is prohibited in this 219 square nautical mile area. The prohibition on fishing will protect the critical life history stage of spawning for gag grouper and scamp, both of which aggregate to spawn in these areas. These marine reserves were originally established for four years, but Reef Fish Amendment 21, which was submitted to NOAA Fisheries for implementation in 2003, will extend the rule establishing the reserves by six years.

Reef Fish Amendment 19 established no-take two marine reserves in the vicinity of Dry Tortugas, Florida on a mutton snapper spawning aggregation site and on pristine coral areas (*Figure 1*). Tortugas North and South Marine Reserves were no-take marine reserves cooperatively implemented by the state of Florida, NOS, the Council, and National Park Service (185 square nautical miles). Tortugas South includes Riley's Hump, which is a pinnacle with relatively pristine coral formations and was the last known spawning aggregation site for mutton snapper in the Gulf. All fishing was prohibited in 1994 on Riley's Hump during May and June (peak spawning months for mutton snapper) by Reef Fish Amendment 5. Tortugas North marine reserve is sited on the northeast portion of Tortugas Bank, which was listed in the Coral FMP as a potential HAPC. Both areas are important spawning sites for the grouper, especially black, red, gag, Nassau, yellowfin, and the scamp and hinds. Snapper observed as using the areas for spawning included gray, mutton, cubera, yellowtail, and dog.

NOAA National Estuarine Research Reserve

Red drum.

In 2004, the Council is completing and submitting to NOAA Fisheries the following reef fish amendments:

- Reef Fish Amendment 22 (Red Snapper Rebuilding Plan • March 2004);
- Reef Fish Amendment 23 (Vermilion Snapper Rebuilding Plan • July 2004); and
- Reef Fish Amendment 18 (Grouper Fishery • September 2004).

Current Issues and Future Challenges

Essential Fish Habitat

Since 1979, under establishment of a Habitat Protection Committee, the Council has been continuously involved in the processes of protecting, restoring, creating, and improving essential fish habitat (EFH). In carrying out this responsibility, the Council established three regional Habitat Protection Advisory Panels for the Texas, Mississippi/Louisiana and Florida/Alabama areas. These panels, represented by federal, state, and user group members, assist the Council in carrying out its habitat protection policies.

In 1998, the Council submitted a Generic EFH Amendment that identified and described EFH for principal stocks being managed by all the FMPs. The Council is now developing, cooperatively with NOAA Fisheries, a detailed Environmental Impact Statement (EIS) for the Generic EFH Amendment. Because of the complexity of the northern Gulf ecosystem and the range of the Gulf region (i.e., 1,600 miles of coastline), the description of the affected environment is extensive. This EIS, when completed in 2004, will more closely define EFH for each species by life stage and identify HAPCs as well as gear impacts on the environment.

In the process of protecting habitat and critical life stages of a number of stocks, the Council has established 135,000 square nautical miles of marine protected areas (*Table 1*). These range from areas where certain fishery gear, such as trawls or longlines, are prohibited, to nursery grounds for juveniles, HAPCs, and marine reserves where all fishing is prohibited.

William B. Folsom, NOAA Fisheries

Bycatch

Significant reductions in bycatch have occurred in the Gulf of Mexico shrimp trawl fishery since the mid-1970s. During that period NOAA Fisheries estimated that the trawl fleet was discarding about 300,000 metric tons of finfish and invertebrate bycatch — a ratio of bycatch to shrimp poundage of about 10:1. By 1995, NOAA Fisheries estimated the average ratio of bycatch to shrimp was reduced to about 4:1. The credit for this reduction in bycatch goes to industry efforts to modify gear and partly to a requirement that all shrimp vessels use trawls equipped with TEDs.

A rebuilding plan for red snapper required further reductions in trawl bycatch. Beginning in 1998, the Gulf Council, through Shrimp Amendment 9, required the use of BRDs in trawls used in the central and western Gulf to achieve at least a 44% reduction in fishing mortality of juvenile red snapper. In 2002, the Council took action through Shrimp Amendment 10 to extend the BRD requirements to the eastern Gulf. Currently, BRD designs are estimated to reduce the bycatch of juvenile red snapper by at least 50%, while the bycatch of other finfish species such as croaker and spot has been reduced by more than half from previous levels.

Marine Protected Areas in the Gulf of Mexico	Area
	(square nautical miles)
Gulfwide Closures	
Stressed Area Closure •	**48,400**
Longline/Buoy Gear Area Closure	
Eastern Gulf ••	24,400
Central/Western Gulf •	47,900
Total	**72,300**
Florida Closures	
Tortugas Shrimp Sanctuary •	3,652
Southwest Florida Seasonal Closure (Shrimp/Stone Crab) ••	
State Waters (1 October - 31 May)	2,562
Federal Waters (1 January - 20 May)	1,489
Total	4,051
Central Florida Shrimp/Stone Crab Separation Zones	174
Florida Middle Ground HAPC •	348
Tortugas South Marine Reserves	60
Madison/Swanson Marine Reserve •	115
Steamboat Lumps Marine Reserve •	104
Florida Total	**8,504**
Texas Closures	
Cooperative Shrimp Closure (15 May - 15 July)	
Initial 15 nautical miles offshore •	5,475
200 miles ••	NA
Flower Garden Banks HAPC •	41
Texas Total	**5,516**
• EFH Closures •• Gear Closures	**TOTAL CLOSED AREAS 134,720**

Table 1.

The Council has developed a number of management measures to reduce bycatch for several fisheries that use traps. For example, traps used in the spiny lobster, stone crab, and reef fish fisheries are required to have escape gaps and degradable panels or door hinges. Fish traps must be returned to shore on the completion of each fishing trip. A recent study of the contents of 21,000 spiny lobster traps indicated that a very low level of non-targeted species were caught, e.g., 67% of the traps contained only spiny lobsters.

Future Directions Being Considered

The Council is considering actions that will affect the future of fisheries in the Gulf of Mexico region. The changes being considered include:

- Incorporation of ecosystem-based management approaches;
- Adoption of a SEDAR Process to improve assessments;
- Refining the use of traditional management tools (size limits, bag limits, trip limits, quotas);
- Consideration of the use of IFQ Programs;
- Consideration of additional HAPCs and MPAs;
- Development of additional strategies to reduce bycatch and bycatch mortality; and
- Development of better bycatch reporting methodology.

6. Pacific Fishery Management Council

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The Pacific Council manages living marine resources in the federal waters off Washington, Oregon, and California, and each of these states are represented on the Council. Because Idaho-origin salmon are caught in Council-managed salmon fisheries, Idaho is also represented. The Pacific Council is composed of 14 voting and several non-voting members. Management agencies from the four member states, NOAA Fisheries, and treaty Indian tribes comprise six voting seats. The remaining eight voting members hold state-designated seats or at-large seats. Currently, of these eight non-agency members, two are commercial and six are recreational representatives. Non-voting members, who advise the Council and engage in Council deliberation, include the state of Alaska, U.S. Fish and Wildlife Service, NOAA General Counsel, Pacific States Marine Fisheries Commission, U.S. Coast Guard, and U.S. Department of State.

The Pacific Council has fishery management plans (FMPs) for salmon, groundfish, and coastal pelagic species (including sardines, mackerels, anchovies, and squid), and highly migratory species (including certain tunas, billfish, and sharks) in the 200-mile Exclusive Economic Zone (EEZ) off the coasts of Washington, Oregon, and California. Combined, more than 100 species are managed under Pacific Council FMPs. Many are assessed at regular intervals, and allowable harvest levels are established each year. Landings of species that are not assessed are carefully monitored to track the need for active management.

There is an enormous diversity of commercial and recreational fisheries managed by the Pacific Council. In some commercial fisheries, only a few types of gear are used

(Photos above, left to right)
Surf fishermen.
William B. Folsom, NOAA Fisheries

Black rockfish.
Kip Evans, Monterey Bay Marine Sanctuary

F/V Miss Julie heading out.
PFMC

Catalina Island off Southern California.
A. Kalvaitis, OAR/NURP

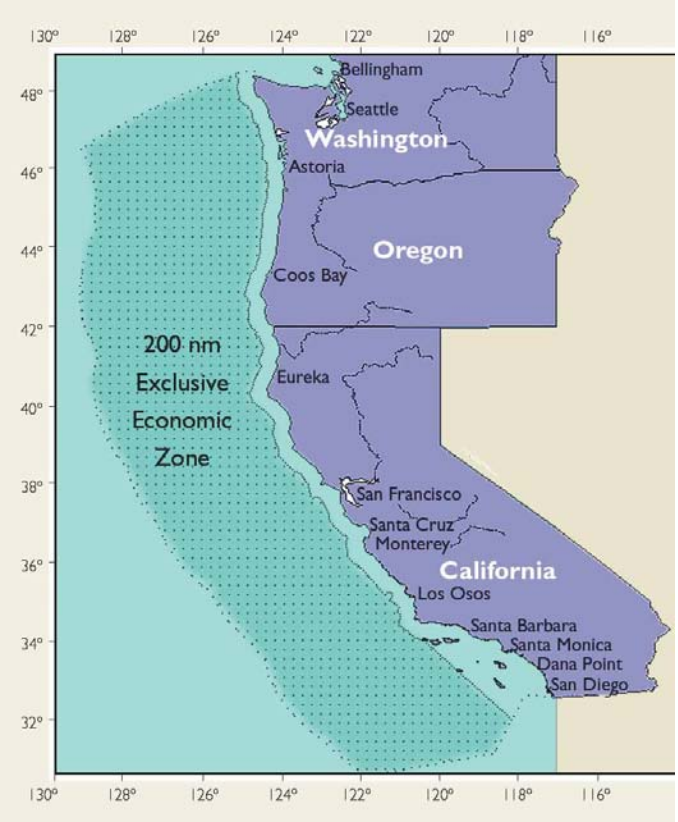
Dory fisherman, Newport Beach.
William B. Folsom, NOAA Fisheries

and only a few species are targeted, e.g., troll-caught salmon and purse seine-caught sardine and mackerel. There is a much more diverse set of gears used and species targeted in commercial groundfish and HMS fisheries. In the groundfish fishery, where over 80 species are included in the FMP, gears include fish pots, line gear, and various types of trawl gear. Highly migratory species fisheries target a variety of tuna, sharks, and billfish with purse seines, troll gear, drift gillnets, harpoons, and pelagic longline gear. Thousands of recreational anglers participate in Council-managed sport fisheries and target many of the same species as the commercial fisheries.

In accord with the ten National Standards of the Magnuson-Stevens Act, the Council endeavors to balance the ecological needs of the resource with sustainability of the various fisheries and their dependent communities. In this task, the Council relies upon a number of advisory groups to provide them with additional guidance, and provide additional opportunity for public input in the development of FMPs, FMP amendments, and specific management measures. Public participation is fundamental to the council process, and all advisory body meetings are open to the public.

Each FMP has both a technical (or management) team and an advisory subpanel. Technical teams are composed of fishery managers, biologists, and statisticians from the federal, tribal, and state agencies. Technical teams monitor catch rates, recommend harvest levels, and analyze the impacts of various management measures. Advisory subpanels are composed of representatives from commercial, recreational, tribal, and conservation groups. They advise the Council on policies that affect the management of their respective fisheries.

The Scientific and Statistical Committee (SSC) reviews the work of the technical teams and outside analysts to ensure Council management decisions are informed



by the best available science. The SSC employs various subcommittees for focused work on fishery-specific issues. For example, the salmon subcommittee annually reviews the analytical methods that form the basis of salmon stock size estimates and harvest policies. The groundfish subcommittee oversees the groundfish stock assessment review process, which serves as a peer review of the scientific foundation of Council management. The SSC also convenes workgroups to address more systemic issues, such as overcapacity in the groundfish fishery, harvest policies, and marine protected areas.

In the Pacific Council region, commercial fisheries, recreational fisheries, and environmental groups are active partners in fishery management. These sectors often have competing priorities, but all contribute greatly to the Council family and Council management. The Pacific Council strives to balance these diverse interests and manage for long-term resource conservation, habitat protection, and fishery sustainability.

Bob Williams, NOAA Fisheries

Native American dipnets for salmon in the Klickitat River in 1968.

Fisheries and Management Plans

In this section, each Pacific Council FMP is described, along with information about historic and current management, fishery descriptions, and current management issues.

Salmon

Since 1977, salmon fisheries in the EEZ off Washington, Oregon, and California have been managed under the Pacific Council salmon fishery management plan (FMP). Managing Pacific ocean salmon fisheries is very complex, due in part to their wide-ranging migration patterns and the state, tribal, federal, and international parties involved. Pacific Council management focuses on chinook and coho salmon. In odd-numbered years small numbers of pink salmon are also harvested in Council-managed waters. There are no directed commercial fisheries for sockeye, steelhead, or chum salmon in Council-managed waters.

Several different groups and regions are involved in the salmon fishery. Recreational fisheries include ocean, inland marine (Puget Sound, Strait of Juan de Fuca, coastal bays), and freshwater (Columbia River) components. Commercial fisheries include various ocean troll and gillnet sectors. Tribal ceremonial and subsistence fisheries (using gillnet, dip net, and hook and line) operate in Puget Sound, coastal bays, Columbia River and its tributaries, and Klamath River.

In 1984, the Council adopted a comprehensive framework amendment that was designed to end the need for annual FMP amendments and supplemental Environmental Impact Statements. This comprehensive amendment (Amendment 6) replaced the 1978 plan as the base FMP document and established a framework of fixed management objectives with flexible elements to allow annual management measures to be varied in response to changes in abundance and other factors. Subsequently, the Council developed various amendments to the salmon FMP to address specific management issues or in response to federal and international obligations. The current FMP includes changes through Amendment 14, which was an extensive revision of the FMP in response to the Sustainable Fisheries Act of 1996.

There are two main components of the FMP: an annual goal for the number of spawners of the major salmon stocks, and allocation of available harvest among different user groups. Every year the Council follows a pre-season process to develop recommendations for management of the ocean fisheries. Generally, public involvement begins in late February, when reports describing the previous season and estimating salmon abundance for the coming season are released. These reports are followed by a Council meeting early in March to propose season options. Public hearings on these options are held in late March or early April, and the final recommendations are adopted at a Council meeting in April. Recommendations are reviewed and,

NOAA Photo Library

Gillnet fishing for salmon off the Washington coast.

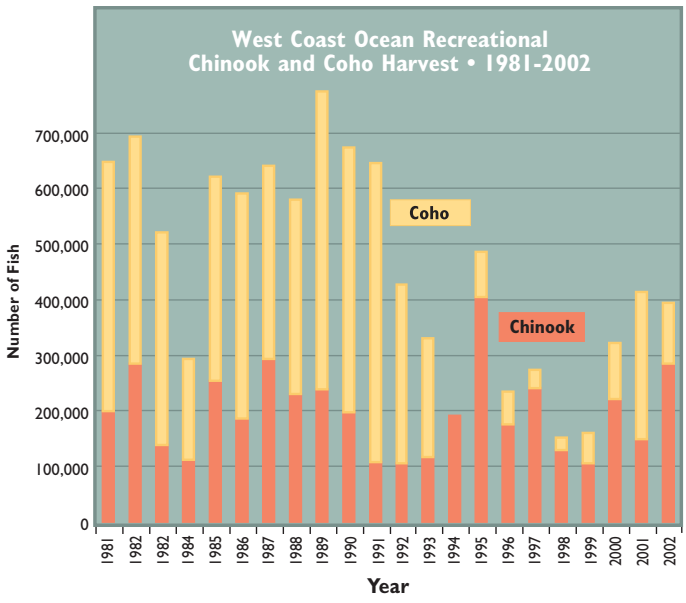
Oregon Economic Development Department

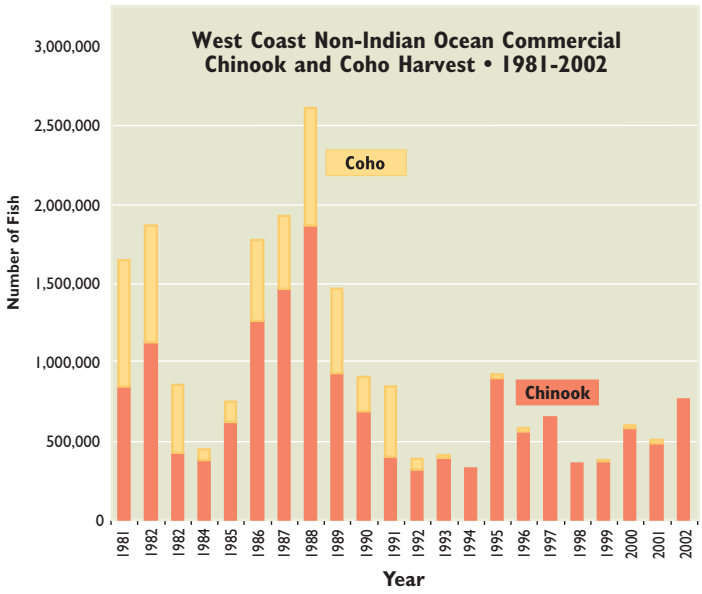
Charter vessel anglers netting a salmon.

if approved, implemented by NOAA Fisheries on May 1. Specific management tools (season length, quotas, bag limits, and gear restrictions) vary year-to-year.

Forecasting the size of salmon populations each year is a difficult challenge. Salmon are affected by many natural and human-caused factors, so their numbers can vary widely. Changes in ocean conditions and weather are major drivers of salmon abundance and distribution, and estimating the effects of these factors is difficult. Other challenges include coordinating with international, regional, and local agencies and groups; judging the effects of these different regional fisheries on salmon stocks; recovering salmon under the Endangered Species Act (ESA); dividing the harvest fairly and equitably; and restoring freshwater habitat. Farmed salmon, bycatch, the use of hatcheries, and perceived differences between wild and hatchery salmon are other issues relevant to Council management.

Salmon fisheries, once the mainstay of many small West Coast communities, have fluctuated significantly during the last quarter century. Since 1989, sixteen salmon stocks have been listed as threatened or endangered under the ESA. Recent improvements in ocean conditions, improved achievement of spawning escapement goals, and habitat restoration resulted in record returns for many stocks, including ESA-listed stocks. In 2003, the largest number of angler trips occurred since 1991 and the second highest commercial value was realized since 1989.





Groundfish

Historically, management of domestic groundfish fisheries was under the jurisdiction of the states of Washington, Oregon, and California. State regulations (on the domestic fishery) were in place for about 80 years, and each state acted independently in both management and enforcement. In the early 1900s, areas were closed because of concerns about stock depletion (for example, San Francisco Bay was closed to trawling in 1906). Minimum trawl mesh sizes were adopted in the early 1930s in California as the production of flatfish decreased. During 1935 to 1940, voluntary mesh size limits were adopted by the trawl industry. Soon after, mandatory minimum mesh sizes were adopted by California. Since then, mesh regulations have been in effect in all three coastal states.

Between implementation of the Magnuson-Stevens Act in 1977 and implementation of the FMP in 1982, state agencies worked with the Pacific Council to address conservation issues. For example, in 1981, the Council proposed a rebuilding program for Pacific ocean perch, which had faced heavy fishing pressure from foreign vessels. To implement this program, the states of Oregon and Washington established landing limits for Pacific ocean perch.

Domestic groundfish landings were relatively stable until the early 1970s, averaging about 30,000 metric tons (mt) per year. Other than Pacific ocean perch stocks (depleted in the late 1960s by foreign fishing) groundfish stocks were apparently healthy. By 1977, when work on the FMP was initiated, domestic landings increased to 60,000 mt and peaked at 116,000 mt by 1982. For the next few years, landings remained around 95,000 mt annually, supported by large rockfish and flatfish catches. At that time, the government encouraged expansion of domestic commercial fisheries through loan guarantees and other programs. Over this same period recreational fisheries were shifting effort away from salmon towards rockfish and lingcod.

PMFC

Hauling in the trawl.

The Groundfish FMP was implemented in September 1982. Over 80 different species are managed under the groundfish FMP, including 64 rockfish, 12 flatfish, 6 roundfish (lingcod, Pacific whiting), and 6 sharks and skates. These stocks support a wide range of commercial and recreational fisheries. Commercial groundfish harvest is managed through a system of cumulative (month or two-month) landing limits. A limited entry program was implemented in 1994. Recent capacity reduction measures include a permit stacking program in the fixed gear sablefish fishery and a buyback program in the trawl fishery. The Pacific Council recently initiated development of an individual quota management program to further rationalize the trawl fishery and enhance resource conservation.

Commercial fisheries managed under the FMP include three primary sectors: limited entry trawl, limited entry fixed gear, and open access. Groundfish are harvested in multi-species complexes, meaning that several different groundfish species may be caught together at the same time. Commercial vessels use a variety of gears and strategies. For example, pot gear is used to target sablefish, and hook-and-line gear to target sablefish, rockfish, and lingcod. Various types of trawl gear are used to target particular species mixes: bottom trawl for deepwater slope species, roller trawl for bottom rockfish, mud gear for nearshore flatfish, and midwater trawl for widow rockfish and whiting. Groundfish (other than whiting) is harvested by catcher boats that deliver to shore processors. Pacific whiting is harvested by boats delivering to at-sea and shore processors, and by catcher-processor vessels.

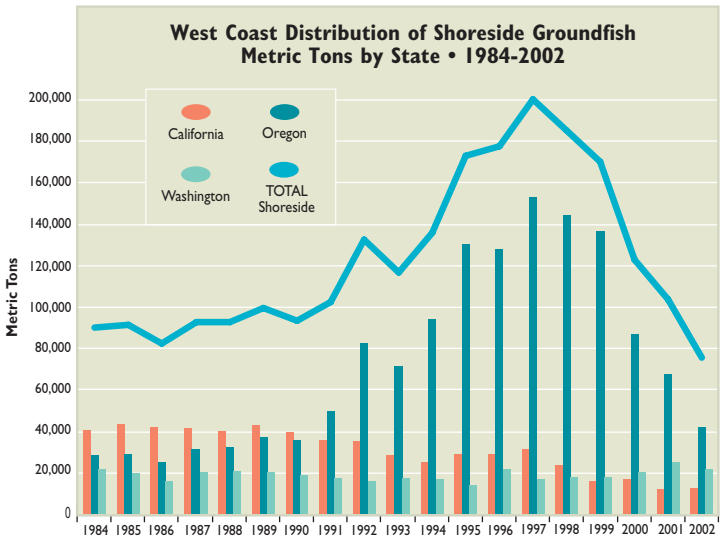
Recreational fisheries harvest groundfish species from docks and piers, beaches, and private or charter boats. Private and charter boat fisheries take the majority of the recreational harvest, mainly nearshore rockfish and lingcod. Sport fisheries vary regionally according to the species mixes targeted, but participation is highest in California.

Members of the Makah, Quileute, Hoh, and Quinault tribes participate in commercial, as well as ceremonial and subsistence fisheries off the Washington coast. Tribal commercial fisheries focus on sablefish, lingcod, and rockfish. In addition, the Makah tribe has participated in the Pacific whiting fishery since 1996.

The two fundamental goals of the Groundfish FMP are to maintain the health of the resource and environment and promote a stable planning environment for commercial and recreational fishery participants. In developing allocation and harvesting systems, the Council considers maximizing economic benefits to the nation, consistent with living marine resource stewardship. Thus, management must be flexible enough to meet changing social and economic needs and to adapt to natural fluctuations in marine resources.

Overall, landings and ex-vessel value of groundfish have declined since their peak in 1982. Between 1983 and 1999, commercial ex-vessel groundfish revenues decreased by 47% from $100.2 million to $52.9 million (in 1999 dollars). This decline occurred in spite of a 12% increase in commercial landings from 108,500 mt to 121,500 mt. The decline was particularly severe for Sebastes rockfish and flatfish, which annually accounted for 50%-60% of groundfish (excluding Pacific whiting) revenues. Between 1983-1999, Sebastes rockfish landings fell by 78% and revenues fell by 69%; flatfish landings fell by 41% and revenues fell by 73%.

Starting in 2000, faced with harvest reductions for various rockfish species, the Council adopted a strategy to separate the major rockfish stocks from the Sebastes rockfish management complex and divide the



remaining species into assemblages. This was intended to bring harvest levels in line with the acceptable biological catches for individual species and assemblages. Most of the stocks known to be depleted are shelf species. To reduce harvest of these species, the Council restricted the use of bottom trawls with large rollers on the footrope and chafing gear when fishing on the continental shelf. The Council believed this would prevent on-bottom trawl activity in rocky areas and effectively reduce both catch and bycatch of shelf rockfish. To further reduce bottom trawl activity, the Council provided incentives (higher trip limits) for vessels fishing with mid-water trawl gear.

For 2002, the Council adopted further significant changes. Based on new information, the Council revised bycatch rates for several species in the limited entry trawl fishery. The Council also adopted significant changes to recreational fisheries, mostly in response to the need to reduce the harvest of bocaccio, canary rockfish, and yelloweye rockfish. Management in 2002 also prohibited retention of yelloweye rockfish in the limited entry fixed gear and open access sectors.

For 2003, to further protect overfished groundfish species, the Council adopted increasingly conservative groundfish harvest levels and a suite of management measures that moved West Coast groundfish fisheries into a new management regime. These Council

decisions were historic in scope considering the breadth of restrictions and the large-scale economic impacts to West Coast fishing communities. Area and season restrictions (including large area closures) were adopted to rebuild overfished stocks. The result was a dramatic restructuring of the groundfish fishery. The centerpiece was adoption of depth-based restrictions to seasonally move fisheries that catch overfished stocks out of the depth zones inhabited by those species.

The most severe restrictions were imposed on fisheries operating in waters off California south of Cape Mendocino. These were designed mainly to protect bocaccio, but also to further protect other overfished rockfish found on the continental shelf and slope. The Council adopted the California Rockfish Conservation Area, which limits the fishing gears used seasonally in the 20-150 fathom (fm) depth zone from the U.S.-Mexico border north to Cape Mendocino. Recreational groundfish fisheries and commercial line and trap fisheries were limited to depths of 0-20 fm or offshore of the 150 fm contour. In the north, fisheries on the continental shelf north of Cape Mendocino were constrained to rebuild canary and yelloweye rockfish. The limited entry trawl fishery was also constrained to protect these species. On the continental slope, fisheries were constrained to rebuild darkblotched rockfish.

In summary, the Council manages over 80 species of groundfish and management of this fishery is a major workload focus for the Pacific Council and our NOAA Fisheries partners. Steep declines in several rockfish stocks have driven major reductions in available harvest, and resulted in time and area closures to protect overfished stocks while providing reasonable harvest opportunity on healthy stocks. The overarching management strategy is to continue to employ seasonal depth restrictions to minimize mortality of overfished groundfish species while attempting to maximize opportunity to harvest more abundant target species (in the case of commercial fisheries) or maximize time on the water (in the case of recreational fisheries). The recently expanded at-sea observer program provides information to enhance monitoring and improve management information. While dedicated, long-term appropriations for groundfish research and management are needed, recent increases in funding for fishery research and expanded socioeconomic efforts have been beneficial.

Coastal Pelagic Species

The West Coast fishery for Pacific sardine began around 1916 in response to a national demand for new food sources during World War I. The fishery expanded rapidly throughout the 1920s, peaking in 1936 at more than 700,000 tons. Reduction for fish oil and fishmeal often dominated production during this period. During the 1930s and 1940s, sardines supported the largest fishery in the Western Hemisphere, with sardines being landed all along the coast, from British Columbia to California. Approximately 200 vessels were participating in the sardine fishery at that time.

The historic fishery began to collapse in the 1940s. Catches in the northern part of the range ceased first. The last catches in Washington and Oregon were recorded in 1948, the last San Francisco landings in 1952. Before 1946, most California-based sardine fisheries landed in Monterey and San Francisco, California. However, with the southward concentration of the sardine stock, most California catches after 1946 were landed in San Pedro (Los Angeles Harbor). Under California state management, the fishery continued at moderate levels up to 1967 when limits were placed on harvest. Directed fishing was halted in 1974 because of drastic stock declines. From 1974 to 1981, landings were less than 50 tons per year.

OAR/NURP

School of northern anchovies.

NOAA Fisheries

Pumping coastal pelagic species from a fishing vessel in San Pedro, California.

In the early 1980s, moderate numbers of sardines were incidentally caught in the southern California fishery for Pacific mackerel. In 1986, California allowed a directed sardine fishery, with an annual limit of 1,000 tons. In 1991, evidence of a continued increase in the sardine population prompted state managers to raise the yearly limit to 8,150 tons. Overall, during the 1990s, landings averaged almost 42,000 tons/year. By 1999, California landings had increased to 62,600 tons. After implementation of the Coastal Pelagic Species (CPS) FMP in 2000, approximately 70,000 mt were landed coastwide. In 2001, landings in the coastwide fishery totaled 74,957 mt, worth just over $9 million. 2002 landings were just over 100,000 mt. 2003 landings are projected to be 75,000 mt.

In 2000, the federal FMP was implemented to manage sardines together with other coastal pelagic species. Five species are managed under the FMP: Pacific sardine, Pacific mackerel, northern anchovy, jack mackerel, and market squid. Annual stock assessments are developed and harvest guidelines are established for Pacific sardine and Pacific mackerel, which are actively managed species. Landings of the other three species are monitored and, if landings rise rapidly, acceptable biological catch is exceeded in two consecutive years, or other significant changes occur in the fishery, a management response would be considered. The state of California continues to actively manage the market squid fishery in California waters and in 2004 will adopt a fishery management plan that includes a limited entry program.

The current federal FMP evolved from the Northern Anchovy FMP, which had been in effect since 1978. In 1990, the Council began considering expanding the scope of the anchovy FMP to include market squid and other CPS fisheries. In 1995, the Council decided to develop a comprehensive FMP for the entire CPS fishery. Development of Amendment 8 to the Northern Anchovy FMP began in June 1997. This amendment greatly expanded the scope of the plan and incorporated a name change to the CPS FMP. Elements of the CPS FMP include a limited entry program, environmentally-based harvest control rules, annual management framework, provisions to reduce bycatch and bycatch mortality, and monitoring through logbook and observer programs. In 2002, the Council adopted Amendment 10, which established a maximum fleet capacity for the CPS fishery, allowed the transfer of limited entry permits, and established criteria for issuing new permits. The amendment also defines MSY for market squid.

The current limited entry fleet for CPS consists of about 65 vessels and operates primarily in California. Recently, sardine fisheries have expanded northward beyond the limited entry area, which runs from the U.S.-Mexico border to Point Arena, California. In Oregon, about 17 vessels participate in the sardine fishery. A similar number of vessels participate in the fishery off Washington. Several of the vessels operating in the Pacific Northwest also hold CPS limited entry permits and may participate in fisheries off California.

Environmental conditions are thought to greatly affect the abundance of coastal pelagic species. Oceanographic cycles, which shift the Pacific basin between cool- and warm-water regimes, trigger major population shifts. Generally, cool-water regimes are seen as more favorable to anchovies and warm-water regimes are more favorable to sardines. Thus, some postulate the sardine recovery could be the result of a shift to a warm-water regime that began in the 1970s. However, there is some evidence that a shift back to a cool-water regime

occurred in the late 1990s, which suggests that abundance of sardine in West Coast waters could begin to decline. In recognition of the relationship between environmental conditions and sardine abundance, the FMP harvest control rule contains a proxy for environmental conditions (i.e., a 3-year running average sea surface temperature). This proxy is one determinant of the fraction of the population that may be harvested in a given year. During favorable environmental regimes (sea surface temperature warmer than 17.2° C) the harvest fraction is set at 15%; in cooler periods, the allowable harvest fraction could range to as low as 5%.

The vast majority of processors and buyers of CPS on the West Coast are located in California, mainly in Los Angeles, Santa Barbara-Ventura, and Monterey. In the past few years, processing facilities have opened in several Columbia River ports (Astoria, Oregon; Ilwaco and Westport, Washington). About 92% of the market squid and 61% of the Pacific sardine catch are exported. Market squid are mainly exported to China, the Philippines, Japan, Spain, and Venezuela. In 2001, sardines went mainly to Japan (where they are used for human consumption and as bait for longline tuna fisheries) and Australia (where they are used to feed farmed bluefin tuna). In 2001, Pacific sardine exports were valued at $26.8 million.

Beyond U.S. waters, Mexican harvest of CPS has increased rapidly in recent years. To ensure fishery sustainability, this increased activity necessitates close coordination of coastwide fishery management and science. This would include, at the very least, the availability of complete Mexican catch statistics for inclusion in CPS assessment models. In this regard. the Council is working with NOAA Fisheries and the U.S. Department of State in pursuing cooperative arrangements with Mexico.

William B Folsom, NOAA Fisheries

Yellowfin tuna.

One very positive example of collaboration among scientists and industry representatives from Mexico, the U.S., and Canada (British Columbia) has been the series of Tri-National Sardine Forum meetings. The Sardine Forum provides an opportunity for industry representatives and fishery scientists from the three nations to share information on the status of their respective fisheries, participate in workshops to improve scientific methods, and garner the perspective of industry representatives about current fishery trends and the concerns of industry.

Highly Migratory Species

The most recent FMP developed by the Pacific Council manages west coast-based fisheries for highly migratory species (HMS), including tunas, sharks, striped marlin, Pacific swordfish, and dorado (mahi mahi). Specifically, the tunas include north Pacific albacore, yellowfin, bigeye, skipjack, and northern bluefin tuna. The sharks include common thresher, pelagic thresher, bigeye thresher, shortfin mako, and blue sharks.

In addition, the HMS FMP includes other species for monitoring purposes. These may be minor species, which are caught and landed or discarded at sea. Under the HMS FMP, these species would be monitored to track trends on a consistent and routine basis. The FMP also proposes to designate some species of fish as prohibited in HMS fisheries because of their special status. These species, if intercepted, must be released immediately, unless other provisions for their disposition are established. Prohibited species include great white shark, megamouth shark, basking shark, Pacific halibut, and Pacific salmon. Also, the Council's HMS FMP prohibits the sale of striped marlin.

White shark cruising offshore from the Farallon Islands.

Scot Anderson, Gulf of the Farallones Marine Sanctuary

The HMS FMP was developed to provide a means to involve all interested parties in the development of conservation and management measures for HMS fisheries. The FMP is a mechanism to cooperate with other regional councils and achieve consistent management of U.S. HMS fisheries in the Pacific Ocean. It also assures issues of national and international concern are addressed, and provides a foundation for improving knowledge of the species and fisheries. Finally, the FMP will be used to incorporate recommendations of international bodies into domestic fisheries off the West Coast.

The FMP includes several commercial and recreational fisheries for HMS off the West Coast. Commercial fisheries include surface hook and line, drift gillnet, harpoon, pelagic longline, and purse seine. Surface hook and line harvests albacore tuna by trolling jigs. Drift gillnet targets swordfish and common thresher shark. Harpoon targets swordfish using a hand-held harpoon. Pelagic longline targets swordfish and tunas on the high seas. Purse seine targets various tunas.

Sport fisheries consist of private boats and charter vessels targeting all of the species in the FMP management unit. The most common gear type is rod and reel, which may be used with artificial lures, live bait, or dead bait. Seasonally, tropical tunas, billfish, and sharks become available off southern California as those species move northward from Mexico. Also seasonally, albacore move into coastal waters and are caught off all three West Coast states. In 1999, the coastwide recreational catch of albacore was about 180,000 fish, which predominated the recreational catch.

As required by the MSA, HMS will be managed to achieve optimum yield (OY). Under the FMP, OY will be set equal to MSY for albacore, yellowfin, bigeye, and skipjack tunas; swordfish; and dorado. For bluefin tuna, striped marlin, and the five shark species in the management unit, OY will equal (0.75*MSY). For thresher shark, a regional harvest guideline of 340 mt will be used. For shortfin mako shark, a harvest guideline of 150 mt will be used. These precautionary harvest levels are intended to sustain local populations of these species.

Generally, HMS managed under the FMP are considered healthy. If a species were to become locally depleted, application of federal rebuilding requirements could be problematic. U.S. fisheries for HMS, and West Coast fisheries in particular, harvest a small fraction of the total international harvest. Thus, effective conservation requires international action. The Inter-American Tropical Tuna Commission (IATTC) conducts most of the stock assessments used to determine stock status. However, the IATTC does not use a specific control rule for determining if a stock is overfished and when remedial action should begin. Therefore, the HMS FMP specifies criteria for determining if an FMP-managed stock is overfished or experiencing overfishing. However, only through international cooperation in the IATTC arena can measures be implemented that would result in rebuilding an overfished stock in the eastern Pacific. While the Pacific Council must develop a rebuilding plan, the Council and NOAA Fisheries will need to work with the IATTC and its member countries to implement such a plan.

For most management unit species in the HMS FMP, harvest by West Coast-based vessels represents a small fraction of total fishing mortality. Any unilateral action, such as a reduction in the West Coast harvest or effort, would not likely have a significant biological effect on the stock. However, U.S. law requires unilateral action when overfishing is determined. Furthermore, unilateral management of U.S. vessels may also be appropriate under some circumstances apart from overfishing. This is particularly true for vulnerable stocks, defined, in part, as stocks that will require more than ten years to recover from depletion. Circumstances where unilateral management by the Pacific Council may be appropriate, not necessarily because of stock

overfishing, include the following situations: where a stock is regionally distributed, and a significant portion of the regional distribution is subject to harvest by U.S. West Coast fisheries; where U.S. laws mandate protection in both U.S. and international waters; or where unilateral action is needed to address domestic issues such as local depletion, protection for essential fish habitat in U.S. waters, bycatch reduction, catch allocations, or conflicts among user groups.

Marine mammals, seabirds, and sea turtles are intercepted by some HMS fisheries (drift gillnet and pelagic long line). Various U.S. laws and international agreements protect these animals. A benefit of the FMP is that these regulations can be incorporated into the Council management process so that all federal regulations are addressed in one process. In fisheries where protected species "takes" (as defined under the ESA) are being addressed, recommendations and supporting analyses would be provided by NOAA Fisheries to the Council for consideration and action as appropriate. The FMP authorizes adoption of measures to reduce interactions with protected species, and contains measures for drift gillnet and longline fisheries.

ISSUES

This section describes issues related to the decline of the groundfish resource, concomitant cuts in harvest opportunity, and the resulting impacts to the fishery and dependent communities. Information is included on the relationship of past harvest policies and fishery management philosophies to the groundfish declines; a review of recent changes to account for total fishing mortality; and a discussion of capacity reduction. As noted above, since the late 1990s, more comprehensive scientific information has revealed population declines in several important species of groundfish. Rebuilding plans are being developed for these species and, since 1999, groundfish fisheries have been managed under policies designed to ensure rebuilding within allowable time frames.

OAR/NURP

Yelloweye rockfish.

In response to dramatic harvest restrictions and declining fishery revenues, the Secretary of Commerce declared a disaster in the groundfish fishery in January 2000. The root causes of these declines are varied, but closely related, including scientifically-based harvest policies ill-suited to many slow-growing, long-lived, low-productivity West Coast groundfish; oceanic regime conditions bringing warm, nutrient-poor water to the West Coast, which amplified the naturally low productivity of these fish; and incomplete accounting of total fishing mortality, including at-sea discards. These factors, in combination with an overcapitalized West Coast groundfish fleet (due in part to government incentives during the 1970s and 1980s to build domestic fishing capacity), led to a situation where too many vessels were chasing too few fish.

The Council and the management process were overwhelmed by this cascade of factors. As described above, management responses included severe restrictions in most West Coast groundfish fisheries and closure of vast geographic areas to fishing. Some conservation groups criticize the Pacific Council for responding too slowly, not heeding environmental signals, and not exercising precaution in the face of uncertainty. Conversely, fishery participants criticize the Council for adopting an overly restrictive management regime, which they believe is based on sparse, flawed science and uncertain conclusions, without due consideration of the economic impacts on the fishery and dependent communities.

The Current Groundfish Crisis

This section is adapted from: Ralston, S. 2002. *The Groundfish Crisis: What Went Wrong?* Ecological Observations for the Monterey Bay National Marine Sanctuary, 2002.

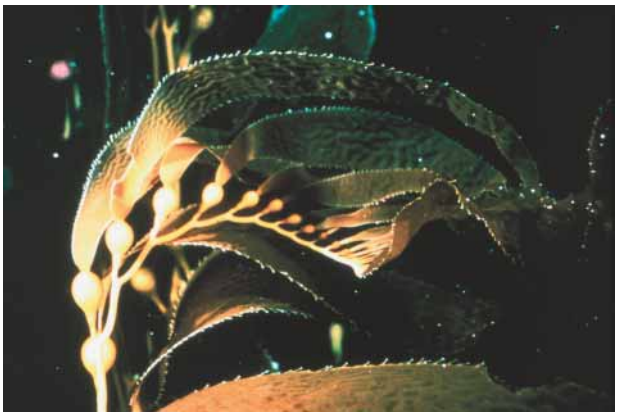
As described above, the groundfish fishery off the U.S. West Coast is under unprecedented restrictions to protect several stocks of overfished groundfish. The Pacific Council has adopted a new management framework for controlling the harvest of depleted stocks within the EEZ. Under this new regulatory framework, large ocean areas are closed to groundfish fishing yearround. For example, south of Cape Mendocino a Rockfish Conservation Area has been established that strictly regulates fishing in ocean waters 120 to 900 feet deep, which essentially encompasses the entire continental shelf ecosystem off the coast of California. Within that depth zone, no fishing for rockfish or lingcod is allowed. This new regulatory framework was implemented to reduce the bycatch of several overfished rockfish species, especially bocaccio.

What caused these stock declines? Mismanagement and overfishing are often claimed to be at fault. However, for years there were serious flaws in the scientific advice that was presented to the Pacific Council as the foundation of its decision making. The deficiencies were not easy to foresee and were due to a combination of inadequate data and fishery productivity that was far lower than anyone had imagined. To understand how we got to this point, one must follow the history of groundfish management since the passage of the original Magnuson-Stevens Act in 1976 up to the present.

At the time the Magnuson-Stevens Act was passed, little was known about the sustainability of West Coast groundfish. Even so, the Pacific Council developed a groundfish FMP that required the determination of conservative acceptable biological catches (ABCs) for each actively managed stock. The ABC is a purely scientific determination that attempts to identify the annual catch of a stock if the fishery were managed to achieve the long-term maximum sustainable yield (MSY). However, facing a dearth of scientific information during the early 1980s, the Pacific Council adopted ABCs for many stocks that were based on the amount of historical catch, which capped groundfish harvests at their existing levels. At the time, this was viewed as precautionary (first, do no harm) management.

As information increased during the 1980s, stock assessments began to be completed on the most commercially important species. A stock assessment is a scientific analysis that assembles all known sources of information about a species (such as landings, age- and length-frequency data, catch-per-unit-effort statistics, life history parameters) and funnels the information into a population model that statistically fits the data. The model is then used to answer questions concerning the status of the stock. Several outputs result from a stock assessment, including an estimate of current stock size and the historical time series of spawning stock size and recruitment (the new additions to the population). In theory, the latter information can be used to establish the productivity of a stock and MSY, and the optimal rate of fishing (F_{MSY}) can be determined. However, because of tremendous year-to-year variation in reproductive success, estimates of recruitment are inherently imprecise. This variability makes it nearly impossible to determine stock productivity parameters accurately.

At the time, instead of relying on imprecise spawner-recruit information to set ABCs, the Pacific Council adopted a harvest policy that is still widely used in fisheries management. That policy consists of applying a constant rate of fishing pressure to a stock, irrespective of population size. This constant rate policy allows removal of a fixed fraction of the stock every year as harvest. Theoretical results show that such a policy has many desirable qualities, although F_{MSY} must first be determined, which requires analysis of highly



OAR/NURP

Macrocystis.

V. O'Connell, ADF&G

Lingcod.

variable spawner-recruit data. However, theoretical results developed in the early 1990s showed that, over a broad range of productivity conditions, harvesting at the so-called $F_{35\%}$ rate would be expected to produce no worse than 75% of MSY. $F_{35\%}$ is the rate of fishing that reduces the reproductive contribution of a new female recruit entering the exploited stock to 35% of what it would be if there were no fishing. Because the $F_{35\%}$ rate could be calculated from basic life history and fishery information, no spawner-recruit analysis was needed. Based on this scientific information, the Pacific Council adopted a groundfish harvest policy that determined the ABCs for each stock by applying the $F_{35\%}$ rate to the estimated stock size.

The important conclusion here is that the Pacific Council adopted a scientifically-based harvest policy to set ABCs, and that harvest levels actually conformed to the policy for many years.

In 1996, the Sustainable Fisheries Act (which amended and reauthorized the Magnuson-Stevens Act) required that all regional councils establish biomass-based targets and thresholds when setting ABCs. Whereas, up until that point, catches were determined solely by current stock size and the harvest rate proxy, now the councils had to consider the overall amount of stock depletion. To satisfy this new law, the Pacific Council adopted an amendment to the groundfish FMP that set a biomass target of 40% of the unfished level (B_0) and an overfished threshold of 25% of B_0. The new law also required that if stock size were to fall below the overfished threshold, then a rebuilding plan had to be developed to return the stock to target level. However, as the Pacific Council began applying its new biomass-based policies, it quickly became apparent that many rockfish stocks were overfished, some severely so.

Nine species of West Coast groundfish have been declared overfished by NOAA Fisheries. They include Pacific whiting, widow rockfish, canary rockfish, yelloweye rockfish, darkblotched rockfish, bocaccio, Pacific ocean perch, lingcod, and cowcod. Rockfish are long-lived, late maturing, and slow-growing species. These traits make them particularly vulnerable to overfishing, the effects of which may be exacerbated by unfavorable ocean conditions. Pacific whiting is highly productive, but extremely variable in abundance; generally, stock size varies in response to prevailing ocean conditions. The most recent assessment of Pacific whiting (March 2004) indicates the whiting stock is now above the biomass target of $B_{40\%}$.

So what went wrong? Results from a recent harvest policy workshop on West Coast groundfish show that over the past two decades these stocks have been very unproductive. Moreover, the fallacy of applying the $F_{35\%}$ rate as a surrogate estimate for F_{MSY} is that under current conditions many groundfish stocks managed by the Pacific Council, especially the rockfishes, are barely able to replace themselves, even in the absence of a fishery. In essence, in the past, the Pacific Council used an established rule of thumb to set ABCs when in fact these stocks were much less productive than average. Because the proxy harvest rate greatly overestimated F_{MSY}, the stocks continued to decline. Currently, the Council uses a more appropriate harvest policy. However, due to the need to rebuild and continued low productivity, it will take many years to rebuild overfished species to their target levels. This will necessitate stringent harvest restrictions for the foreseeable future.

Bycatch and Total Catch Accounting

The Pacific Council first adopted trip limits for the groundfish fishery in the early 1980s. These regulations were intended to slow the harvest rate of individual species, support a year-round fishery, and ensure harvest did not exceed optimum yield (OY). As trip limits were reduced over time, the Council gradually replaced them with cumulative landings limits (i.e., vessel landings limits per month or two month

period), which were intended to reduce discarding and allow vessels more operational flexibility. Because cumulative limits apply to landings and not catch, fishing can continue for other species once the limit for a particular species is reached. Although unintended bycatch may occur while fishing for these other species, any catch in excess of the limits cannot be legally retained and must be discarded.

Several observer programs were implemented to collect data on the effects of trip limits as a management tool. During 1985-1987, a voluntary observer program was conducted, primarily off Oregon. This program determined that 16% to 20% of the total catch (for species regulated by trip limits) was discarded. The Pacific Council used this estimate of discard rates during the 1990s. A second voluntary observer program was conducted during 1988-1990, which primarily assessed the impact of potential changes in codend meshsize and shape in the West Coast groundfish trawl fishery. During 1995-1999, Oregon Department of Fish and Wildlife administered the Enhanced Data Collection Project. The primary goal of this project was to collect data on discard rates for groundfish species and to determine bycatch rates for prohibited species (salmon and Pacific halibut).

Prior to 2001, the Council generally based discard estimates on the research conducted in the late 1980s. The standard discard estimates used were 16% or 20% (depending upon the species), and were calculated as a fraction of the total catch of the species being estimated. In 2001, a mix of approaches was used. For various species, some discard estimates were based on the 16% or 20% standard, while others were based on information from the more recent data collection projects.

For the 2002 management year, a new trawl bycatch model was developed. This model predicted the rates at which overfished species were caught by trawl fisheries targeting more abundant co-occurring species. Protection of overfished species had become the paramount management concern. This prompted bycatch modeling for overfished species to determine the impacts on these stocks. The 2002 trawl bycatch model included seasonal and geographic variation in the co-occurrence ratios of overfished species with target species along the West Coast. In contrast, bycatch and discard rates for target species were addressed through precautionary adjustments in the OYs for those species, rather than in the bycatch model itself.

In May 2001, NOAA Fisheries established the West Coast Groundfish Observer Program. Under this program, vessels that participate in the groundfish fishery are required to carry an observer when notified to do so by NOAA Fisheries. A goal of the observer program goal is to improve estimates of total catch and discards. In the first phase of the program, approximately 20 observers were deployed. Subsequently, with an increase in resources, the number of observers increased to as many as 40.

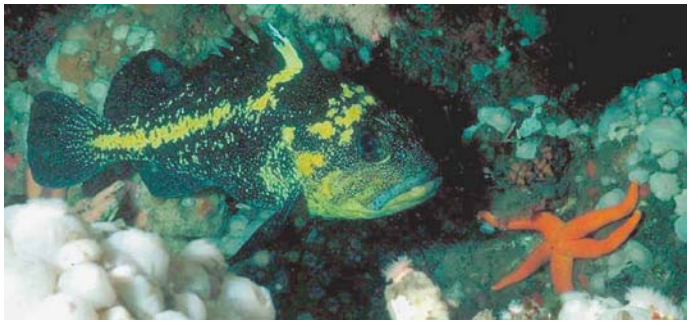
Data from the West Coast Observer Program did not become available until January 2003. Thus, for 2002 management, the bycatch model used rates from the previous observer experiments carried out in the late 1980s and mid-1990s. Using this bycatch model, the Council crafted management measures intended to concentrate fishing pressure for targeted stocks in times and areas where overfished species were less likely to occur. During 2002, the Council reviewed landings levels and recommended inseason adjustments based on the bycatch models' prediction of incidental catch rates of overfished species.

OAR/NURP

Diver descends through kelp bed.

For 2003 management, the Council developed depth-based regulations, in which vessels would be prohibited from fishing for target species in depth zones where overfished species occur. To accommodate this management change, the trawl bycatch model was revised by stratifying co-occurrence ratios for overfished and targeted stocks across different ocean bottom depths. As for 2002 management, the revised model addressed the bycatch of overfished species. The trawl bycatch model used in developing 2003 management measures did not include observer program data, since data from year one were not available until January 2003. In January 2003, the SSC held a workshop to review the bycatch model and made a series of recommendations for incorporating observer data. The bycatch model was revised in response to these recommendations. For 2003 inseason management, the Council used the new overfished species bycatch rates.

For the 2004 fishing year, the bycatch model was revised to incorporate an additional component drawn from the first year of observer data. In addition to linking bycatch of overfished species to catch of target fisheries, the revised bycatch model also includes discard of target species as a function of total catch of those species. For some targeted species, these observer-based discard rates showed a higher discard rate by trawl vessels operating at shallow nearshore depths than by trawl vessels operating at much deeper continental slope depths. The Council used the revised bycatch model to set 2004 management measures. The model will also be used inseason to manage fisheries to stay within total catch OYs during 2004.



Alaska Fisheries Science Center

China rockfish.

Capacity Reduction

Ideally, fishing capacity would be in line with allowable harvest levels. Since 1987, the Council has endeavored to reduce capacity in the West Coast groundfish fishery. A limited entry program was implemented in 1994. In 2001, a permit stacking program was implemented in the limited entry fixed gear sablefish fishery. Fishery stability and resource sustainability were paramount goals of these programs.

Currently, economic hardship and uncertainty pervade the industry, and is intensifying competition among fishery sectors for access to the resource. Individual fishermen, communities, and competing groups have become increasingly polarized and management information needs have increased. Protecting groundfish stocks, while ensuring that the burden of conservation measures is distributed equitably among sectors of the fishery, is becoming increasingly difficult. The current problems associated with low landings limits, short seasons, and complex regulations will not go away unless meaningful capacity reduction is achieved.

Capital utilization rates are quite low for all sectors of the commercial groundfish fishery. In 2000, it was estimated that 9% of the limited entry fixed gear fleet could harvest all of the sablefish allocated to that sector and 12% of the fleet could harvest the non-sablefish components of the fishery. For the trawl fishery, only about 27%-41% of the fishing capacity, at that time, was needed to catch and deliver the shore-based harvest, and 6%-13% of the open access vessels could take that sectoral groundfish allocation. To address this excess capacity, the Pacific Council recommended reducing capacity by at least 50% in each sector of the groundfish fishery.

There has been steady progress toward this capacity reduction goal. A permit stacking program in the limited entry fixed gear sablefish fishery was implemented. The recent West Coast groundfish limited entry trawl buyback program, initiated by congressional legislation, is another example of progress. In accord with the Groundfish Strategic Plan and the needs of the

groundfish fishery, the next phase is development of a fishing quota program for the limited entry trawl fishery. Laying the foundation for quota-based management will be complex, involve many stakeholders, and require a substantial amount of time. In June 2003, a committee was appointed to develop an individual quota management program.

Effectively reducing capacity in the groundfish fishery would provide economic relief and begin the process of revitalizing this beleaguered fishery and the many fishery-dependent communities along the West Coast. A rationalized groundfish fishery would also provide conservation benefits and facilitate rebuilding of overfished stocks. At-sea discards and mortalities should be reduced as the fishing industry would be able to operate at a slower, more rational pace. A smaller fleet would also be easier to monitor under the West Coast observer program. Improved catch and bycatch monitoring would provide better data on total fishing mortality, improving stock assessments. These benefits would provide greater assurance to the public that the fishery is managed sustainably.

Individual quota-based management for the groundfish trawl fishery has been on the Council workload list since adoption of the Groundfish Strategic Plan in October 2000. Other workload priorities (and a congressional moratorium on individual quota programs) dampened program development. However, with the positive results of the permit stacking system, confidence in the success of the groundfish buyback program, and evidence of successful quota-based management in other regions, there is increasing support among fishery participants, conservation groups, and the public for the use of individual quota management in West Coast fisheries. At this time, there is general agreement that quota share-based management would help the West Coast groundfish trawl fishery — help to reduce fishing capacity, help to improve fishery conservation and sustainability, help to improve management information, and help to improve public confidence in our ability to manage this fishery.

Carol Baldwin, NOAA OMAO

Tillamook Head, Seaside, Oregon.

Recommendations

In the near future several factors will influence fundamental aspects of the regional council process. The congressionally-appointed Commission on Ocean Policy will soon complete their report to Congress. NOAA Fisheries is reviewing National Standard 1 guidelines and the National Academy of Science is reviewing the concept and application of best available scientific information. These, and other initiatives, will be used by Congress as they consider reauthorization of the Magnuson-Stevens Act. Thus, the Pacific Council offers the following recommendations and insights about issues that will affect how the Pacific Council functions and the viability of our management programs.

Development of Management Science — the Council Role

Criticisms have been made of the Council process and Council decisions. Generally, these criticisms reflect the Councils' legal mandate to balance conserving living marine resources with sustaining fisheries and fishing communities. Some argue that economic priorities too often trump conservative, environmentally-precautionary management decisions. Conversely, others argue that highly restrictive management measures are based on flawed science and do not consider the resulting economic impacts on fishermen and communities. It is also claimed that the public is not heard by the Council when it considers and adopts important management recommendations.

One criticism that has been around since implementation of the regional council system is that council decision makers have an inherent conflict of interest in the fishery management actions they take. A counter argument is that fishery interests have a large stake in the

NOAA Fisheries

Santa Barbara.

outcome of management decisions and, hence, should have a voice in the process. This latter point, some argue, reflects the intent of Congress in designing the regional council process and MSA.

More recently, there have been calls to alter the role of the regional council in establishing harvest policy. Some argue that decisions on allowable harvest levels (objective science-based decisions) should be left solely to NOAA Fisheries. Under this system, councils would be tasked with allocating allowable harvest among the fishery participants, and have little (or no) input into the development of optimum yield values. This proposal seems contrary to the will of Congress in establishing the regional council system.

Embodied within the council process is the strong sense that each region has unique needs and issues that require flexibility in management. For example, the Pacific Council relies on a multi-stage process to develop annual harvest levels. As in most regions, stock assessments generally do not provide a single, simple answer; an inviolable point estimate of population status. Most assessment models produce a range of plausible population estimates. Under the current system, the Pacific Council develops harvest specifications in partnership with NOAA Fisheries and state management agencies, and with oversight, peer review, and arbitration provided by the Scientific and Statistical Committee. As with all regional council recommendations, harvest levels and management specifications are subject to NOAA Fisheries review and federal rulemaking.

For our groundfish fishery, the Pacific Council relies on a rigorous stock assessment review process, which is coordinated by NOAA Fisheries-Northwest Fisheries Science Center. The Councils' SSC has oversight and arbitration authority over the stock assessment review process. A principal goal of the stock assessment review process is quality control of the information (i.e., scientific data, methods, and analyses) used by the Council. The process lifts the veil of secrecy and provides public access to (and understanding of) management science. The stock assessment review process, while complex and burdensome, provides assurance to all stakeholders that Council decisions are informed by the best available science, which engenders trust in the Council process. Thus, in the Pacific Council context, it is difficult to rationalize how the proposed science *v.* allocation arrangement would result in greater benefits to the fishery or improve resource conservation.

Council decisions are made through this open, participatory, and collaborative process, and these decisions are informed by the best available science (as mandated by Congress), which is developed and vetted with SSC oversight. Council decisions seek to balance conserving fishery resources with sustaining the fisheries and communities dependent upon those resources. Finally, those decisions, if found to comply with National Standards, are implemented and enforced by NOAA Fisheries.

One alternative to the current system for developing management science and harvest levels would be a centralized authority vested with the power to create and implement policies by fiat, with minimal direct public involvement. It could be argued that this proposed system would be extremely vulnerable to political influences, notably by the strongest voice of the day. The resulting policies would likely not have broad public support nor be received warmly by fishery participants. It is also likely that, given the shifting nature of political winds, policies could be changed frequently and result in a highly unstable management regime. In the end, this alternative system would likely result in more losers than winners and not improve benefits to the nation relative to the current system.

For these reasons (congressional intent, stability and trust, and net national benefit), from the perspective of the Pacific Council, it appears the current regional council system, while not wholly perfect, is best suited

for managing regional fisheries. Moreover, the current National Standards provide assurance that living marine resources are managed by fundamental, guiding principles for long-term ecological and environmental stability.

National Standard 1

In February 2003, NOAA Fisheries published an advance notice of proposed rulemaking indicating their consideration of the need to revise National Standard 1 guidelines. The Pacific Council supports formal reconsideration of National Standard 1 (NS-1) guidelines. As with any policy, periodic review provides opportunity to respond to new information, changes in thinking, or unforeseen consequences since the policy was developed and implemented.

Existing National Standard 1 guidelines are not a perfect fit for many West Coast stocks (e.g., rockfish, highly migratory species, salmon, Pacific sardine, market squid). This is especially true for several West Coast stocks declared overfished (e.g., darkblotched rockfish and bocaccio). For these slow-growing, long-lived species, the Council is striving to fully comprehend and account for extremely low productivity and the effects of unfavorable oceanographic and other environmental variables on these stocks. This difficult task should be facilitated, rather than hindered, by NS-1 guidelines. For example, in cases where it could take many decades to rebuild certain overfished species, it would be helpful to explore and include mechanisms that ensure rebuilding plans are in accord with (and adaptive to) environmental and other variables.

In considering revising NS-1 guidelines, the Pacific Council recommends these areas of focus:

- *MSY*. Review of the estimation and application of this management concept.
- *Uncertainty, risk, precaution*.Where and how are these concepts incorporated into stock size estimation, status determination, and management process? How should precaution be tied to stock productivity; and short-, mid-, and long-term environmental conditions?
- *Rebuilding time horizons*. Under the existing guidelines, a fishery is less restricted if an overfished stock is so depleted it will take more than ten years to rebuild than if the stock is in better condition and must be rebuilt in less than ten years. This requirement is the opposite of typical fishery management practices that are more restrictive the worse the condition of the stock. Also, choices among these time horizons depend on very fine distinctions in current biomass, unfished biomass, and stock productivity, which are often based on very sparse information.
- *Data-poor situations*. Under data poor situations, current guidance for determining stock status can result in very constraining (i.e., precautionary) management, which causes significant economic impacts to the fishery. Given limited scientific and economic information, how should precautionary management be balanced against economic impacts? Some believe economic impacts are rarely given quantitative consideration. Others believe uncertainty necessitates precaution.
- *Species that can become overfished due to ocean regime shifts*. How should highly variable species be treated (e.g., Pacific whiting, northern anchovy, sardine, market squid), especially given their sensitivity to environmental variability and oceanographic regime shifts?
- *Process for revising approved rebuilding plans to comply with changes in NS-1 guidelines*. Will regional councils be asked to redo all rebuilding plans immediately? Will approved rebuilding plans be valid during the transition period? How long will it take to get approval of the numerous revised rebuilding plans?

NOAA Fisheries

NOAA Fisheries

Commercial and recreational boats share a harbor in Seattle.

In revision of National Standard 1 guidelines, the Pacific Council is willing to work with NOAA Fisheries and others to craft guidelines that meet current needs and provide direction for the future.

National Standard 2

Currently the National Academy of Science Ocean Studies Board is reviewing the concept of best scientific information available as the basis for fishery conservation and management measures.

In the past, fisheries science was largely limited to biological information on stock status. This information was typically derived from federal and state research surveys and federal and state fishery monitoring (e.g., logbooks, landings receipts). More recently, fisheries management has begun to incorporate socioeconomic information and physical and chemical oceanographic information. This trend toward expanded information is due in part to growing sensitivities to the importance of considering fishing community impacts and ecosystems dynamics in management.

However, the availability of basic biological, socioeconomic, and ecosystem information is constrained by lack of funding for information collection, database management, and coordinated use and dissemination. In recent years, federal funding for fisheries-related research has expanded, but state funding has declined. In addition, mandated constraints on economic data collections (Paperwork Reduction Act, Magnuson-Stevens Act) hinder development of comprehensive socioeconomic information. While a good bit of physical and chemical oceanographic information exists, understanding the effects of these forces on fish stocks and fisheries is rudimentary, which prevents full incorporation of this information into the fishery management process. For example, how should large-scale oceanographic or climatological events be considered in day-to-day management of a fishery?

Moreover, annual management of fisheries requires just-in-time decision making and, thus, must be based on information available prior to a Council action. The Pacific Council process occurs over a series of public meetings of stakeholder groups and technical committees. Scientific information is reviewed and vetted through this process on the way toward a Council action. Information that surfaces after this decision making process is, generally, not considered. A fundamental reason for this constraint is the requirement that regional council management recommendations go through the formal federal rulemaking process, which adds six months of agency review and public comment prior to NOAA Fisheries implementation of a council management recommendation.

Therefore, in reviewing the concept of best available science, several issues merit consideration — what types of information are used/required in management; how timely/current is the information; is there long-term funding dedicated to information collection, data management, and coordinated use; what are the mandated constraints on the ability to collect and use information; and what tools are needed to ensure optimal use of comprehensive information?

In summary, the best available scientific information includes information available prior to decision making that is vetted through a system similar to the Pacific Council stock assessment review process. Given limited staff and resources, the burden of collecting, managing, and analyzing scientific data must be shared by state, federal, tribal fishery management agencies and the Council. Quality science and sound management depend on stable and sufficient funding. Hence, congressional support and NOAA Fisheries leadership are fundamental to developing the best available scientific information. The regional council system is key to the use of this information in conserving living marine resources and sustaining fisheries and communities.

OAR/NURP

Diver deploys a plankton net in a kelp forest to collect larval fish off the California coast.

Conclusion

This paper describes the Pacific Council and the Council family, the fisheries we manage, several current issues in the groundfish fishery, and a series of recommendations for the future. This information is not meant to suggest that everything is okay and that no problems exist. The Pacific Council is under tremendous pressure to fulfill our congressional mandate to balance resource conservation with fishery sustainability. National Standard 1 requires regional councils to prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery. In this regard, the intent of Congress has been interpreted to mean that conservation is paramount and regional councils should always exercise precaution in the face of uncertainty. Others interpret the Magnuson-Stevens Act as a mandate for maintaining harvest opportunity for commercial fisheries and vibrant recreational fisheries, both of which provide economic benefits to the nation. The role of the regional council is to balance these competing interests and develop sound management policies that provide the greatest benefit over time.

Effectively managing U.S. fisheries requires a collective effort. The regional council system provides a public forum for all interested participants to have a voice in management of their resources. Criticism is easy; achievement is difficult. To achieve Congress' vision for our living marine resources, the regional council system needs to be nurtured, not neutered. Regional councils and our state and federal management partners need leadership from Congress and NOAA Fisheries, dedicated and sufficient funds to research and manage, and strong partnerships with fishery participants, conservation groups, and academia. The Pacific Council stands ready.

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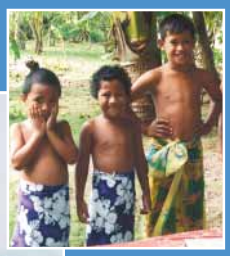

7. Western Pacific
Fishery Management Council

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In 1976, the United States Congress passed the Magnuson Fishery Conservation and Management Act, which established eight quasi-federal regional councils to manage fisheries in the exclusive economic zone (EEZ) surrounding the United States. Under this Act, subsequently reauthorized as the Magnuson-Stevens Fishery Conservation and Management Act, the Western Pacific Regional Fishery Management Council (Western Pacific Council or Council) is the policy-making organization for the management of fisheries in the EEZ adjacent to the Territory of American Samoa, Territory of Guam, State of Hawaii, the Commonwealth of the Northern Mariana Islands and the United States Pacific island possessions of Jarvis, Johnston, Wake, Howland and Baker Islands, Kingman Reef, and Palmyra and Midway Atolls *(Figure 1)*. With a total EEZ area of 1.5 million nm^2, this is the largest area managed by any of the regional fishery management councils, and comprises about half of the total EEZ waters under United States jurisdiction. This tremendous area is spread across the Pacific dateline and the equator.

The main task of the Council is to protect marine resources while maintaining opportunities for domestic fishing at sustainable levels of effort and yield. The Council monitors fisheries within its region and prepares and modifies fishery management plans. It develops policies and management plans following the management principles and scientific requirements of the Magnuson-Stevens Act, with consideration of the social, cultural and economic values and realities of its island communities. The Council strongly encourages cooperative fishery management among the islands and distant-water fishing nations throughout the Pacific region.

The fisheries under the Council's jurisdiction range from small-scale artisanal fisheries within the United States waters to large-scale commercial fisheries in international waters. The fish caught in these fisheries are marketed worldwide as high quality fresh fish and as canned, dried and frozen products. Within the region there is a particularly high demand for high quality fresh fish as well as a demand for a wide range of fishery products by a culturally diverse population.

The Council plays an integral role in multilateral management of highly migratory Pacific stocks. It works with other nations and territories in the Western Pacific through participation in the South Pacific Conference and the Western and Central Pacific Fisheries Convention. It also provides assistance to United States territories negotiating Pacific Insular Area Fishery Agreements to permit foreign fleets regulated access to EEZ waters. Future management of pelagic fisheries will require the Council to maintain a high degree of participation at the international level.

Through exemplary collaborative studies with environmental organizations and industry, the Council has made significant strides towards identifying effective and practicable methods to minimize the incidental take of seabirds in longline fisheries. Plans are now being developed, again employing this collaborative approach, to find similarly effective and practical methods to minimize the incidental take of sea turtles in longline fisheries. The Hawaii pelagic longline fleet comprises roughly 3% of the total pelagic longline vessels operating in the western and central Pacific Ocean region and roughly 5% of the total effort in terms of number of hooks set per year in this area. To ensure the sustainability of longline fisheries, the Council must focus on identifying the best sea turtle and seabird mitigation methods and mainstreaming their use by both domestic and international fleets. The Council will also focus on incorporating principles of ecosystem-based management into all of its existing Fishery Management Plans (FMPs), continuing its efforts to provide indigenous communities access to marine resources, and conducting stock assessments to implement new biomass-based overfishing control rules.

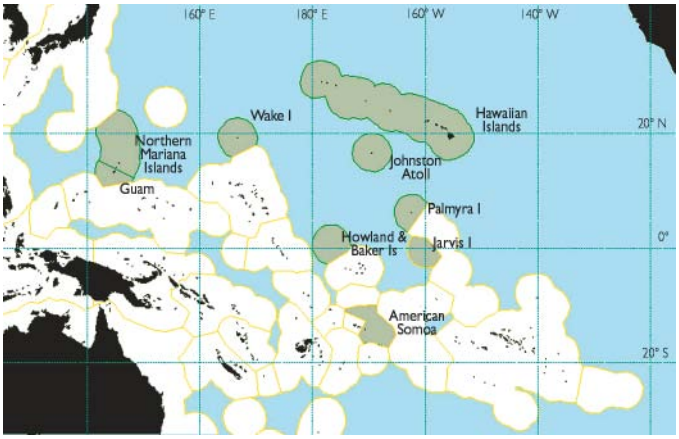

Figure 1 EEZ waters managed by the Western Pacific Council

The U.S. Pacific islands are politically and culturally diverse, comprising one state, two territories, a commonwealth and seven small islands and atolls of various jurisdictions. Fishing is of social and cultural significance to island communities. Pre-colonization Polynesian and Micronesian societies were heavily dependant on fish as a source of animal protein. Fish and fishing have unique socio-cultural significance for the indigenous peoples of the Western Pacific Region, and it was primarily with this in mind that the interests of island indigenous peoples were embodied in the Magnuson-Stevens Act during its 1996 reauthorization.

Today, U.S. Pacific island populations include East and Southeast Asian immigrants, who share with the original Polynesian and Micronesian societies a strong fishing tradition and a strong dependence on fish for a large portion of their protein intake. Fish consumption in Micronesia and Polynesia typically averages about 130 lb/person/yr and even in more culturally diverse Hawaii, fish consumption is twice the United States national average at about 90 lb/person/yr. Further, although most people do not need to fish to obtain food, recreational fishing is still an extremely popular pastime and is a cultural link with the activities of pre-contact societies. This also includes Hawaii, where at least one quarter of the population participates in some form of fishing activity at least once per year and the level of community involvement in fishing is higher than in many other United States. Recreational fishing in Hawaii involves not only residents but also a significant number of the annual 6.6 million tourists who want to experience game fishing in the tropical Pacific. This high level of recreational fishing activity is

Photo courtesy Bishop Museum

economically important for the State and also of concern to the Council since much of it occurs in waters over which the Council has jurisdiction.

Unlike most other regions, the Western Pacific Region has little coastal shelf area and so the greatest volume of commercial fisheries production comes from highly migratory pelagic fishes, particularly tunas and swordfish. Demersal fisheries are of additional economic importance in Hawaii where there are limited fisheries for large snappers that live on the deep outer reef slopes, banks and seamounts. These species are also culturally important to elements of the Asian population in Hawaii, as large red fish are components of holiday feasts. An economically important trap fishery targeting lobsters on reefs and banks of the Northwestern Hawaiian Islands (NWHI) is now inactive pending research results. The balance of fishery production comes from fishing in the coastal zone, primarily from coral reefs and associated environments, and on small pelagic fish in the coastal zone.

These islands have unique political relationships with the United States. The State of Hawaii has four voting members of Congress and its citizens participate in the election of the U.S. President. The Territories of American Samoa and Guam and the Commonwealth of the Northern Mariana Islands have non-voting representatives in Congress and its citizens do not participate in presidential elections. Nevertheless, the Council process affords these territories and commonwealth the ability to participate in the management of regional fishery resources.

Western Pacific Fisheries — Past to Present

Fishing in the Pacific islands has traditionally focused on the coastal zone, but island fishermen were able to range beyond the lagoons to fish the outer reef slope for bottomfish and oilfish and the offshore waters for large pelagics such as tuna, rainbow runners and wahoo. Many different traditional fishing techniques have been documented from the various islands of that now constitute the Western Pacific Region. These include traps, weirs, snares, hooks, gorges, nooses, nets and spears manufactured from locally available materials and developed through the accumulation of many centuries of experience. Along with possessing exceptional fishing skills, Pacific islanders are also highly skilled seamen navigating long distances over the open ocean, with systems based not on mathematical concepts, but an intuitive navigational system that integrate observations of the physical environment, behavior of marine fauna and astronomical observations.

The traditional paddle and sail powered canoes, typical of the region, have not entirely disappeared in the Pacific but have been largely replaced by fiberglass and aluminum skiffs powered by outboard motors. Similarly, urbanization and economic development have tended to focus fishing activity on variations of seine or gill netting, spearfishing (surface and diving) and hook-and-line fishing (handlining and trolling). Although the range of fishing activities has narrowed,

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Domestic Commercial Fisheries of the U.S. Pacific Islands

Location	Pelagic	Bottomfish/Reef Fish	Crustaceans	Precious Corals
Hawaii	Longlining for swordfish and tunas. Ika-shibi handlining for yellowfin. Palua-ahi handlining for yellowfin and big eye tunas. Trolling for tunas and other pelagics. Pole-and-line fishing for skipjack.	Deep slope handline fishery for large snappers, jacks and grouper. Various fisheries for coral reef associated species.	Trap fishery for spiny and slipper lobster.	Dive fishery for black coral. Submersible-assisted harvest for deepwater precious coral (red, pink, gold).
American Samoa	Longlining for tunas. Trolling for tunas and other pelagics.	Bottomfish handline large snappers, jacks and grouper. Various fisheries for coral reef associated species.		
Guam	Trolling for tunas and other pelagics.	Shallow (100 – 500 ft) handline fishery for reef-dwelling snappers, groupers and jacks. Various fisheries for coral reef associated species. Deep-slope (500-700 ft) handline fishery for large snappers, jacks and grouper.		
Northern Mariana Islands	Trolling for tunas and other pelagics.	Deep slope handline fishery for large snappers and groupers. Various fisheries for coral reef associated species.		

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Table 1

the relative fishing power of individual fishermen has increased with the introduction of monofilament nets and lines, metal hooks, diving gear such as fins and masks, and steel spears propelled by spear guns and surgical rubber bands. The acquisition of outboard motors and diesel engines has also meant that fishermen are able to reach coastal and offshore locations that in the past might have been inaccessible or visited only infrequently. In the last 20 years, the development of sonar and satellite technology has made fisheries more efficient and fishermen more effective at finding target fish.

The adoption of modern gears and vessels has often been accompanied by loss of the traditional body of knowledge concerning the natural history and life cycles of fish and other marine organisms. Pacific island fishermen developed systems of tenure over reef and lagoon areas and systems to regulate these fishery resources based on natural cycles. Traditional ownership of nearshore reef and lagoon areas is still strongly maintained in parts of the region. However, such systems break down with increasing urbanization and more contemporary management systems often fail to replace these older systems in their ability to regulate fishing.

Most of the domestic commercial fishing activities in federal waters surrounding the United States Pacific islands are variations of fishing with hooks and lines *(Tables 1 and 2)*. Longline fisheries established in Hawaii and American Samoa dominate the fishing industries in both locations. Domestic commercial fishing activity in each region also includes handlining for large snappers and groupers on the outer reef slope and trolling, handlining and longlining for pelagic fish. The now dormant trap fishery for spiny and slipper lobsters based in the remote Northwestern Hawaiian Islands (NWHI) was the only lobster fishery of any significance in the U.S. Pacific islands. Mention should also be made of precious coral harvests, which have taken place in the past in federal waters in Hawaii, and

Landings in lbs of Domestic Commercial Fisheries in the U.S. Pacific Islands • 2002

Location	Hawaii	Am Samoa	Guam	CNMI	Total
Pelagic Fish	21,576,000	15,328,000	319,800	253,270	37,477,070
Bottomfish	615,000	37,350	13,920	46,980	713,250
Reef Fish	339,000	15,120	139,100	152,150	645,370
Other Fish	1,310,000	8,700	9,520	26,790	1,355,010
Total	**23,840,000**	**15,389,170**	**482,340**	**479,190**	**40,190,700**

Table 2

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are currently active in state waters. Harvesting of precious corals in Hawaii is conducted with SCUBA gear in shallow waters and is conducted by submersibles in deeper water.

Bottomfishing is conducted throughout the region but is only of major significance in Hawaii and represents a small fraction of total landed value of all catches. Most bottomfish grounds in American Samoa, Guam, the Northern Mariana Islands and the Main Hawaiian Islands (MHI) are within the 0-3 nm zone and thus fall under State or Territorial jurisdiction. However, the NWHI represents a substantial area of bottomfishing grounds within Council jurisdiction and there are significant bottomfish banks and seamounts in the MHI, such as Penguin Bank, that lie within or extend into federal waters. These four island groups also have a wide variety of small-scale inshore fisheries for reef fish, mostly within the 0-3 nm zone. The Council's newly developed Coral Reef Ecosystem Fishery Management Plan provides the Council with jurisdiction over any reef fishing conducted in federal waters.

Prior to 1999, commercial finfish fisheries based in the U.S. Pacific islands landed about 32 million pounds of fish worth an estimated $56 million. At that time 89% of landings were from Hawaii-based fisheries, and most of this volume (97%) was from pelagic fisheries, principally from Hawaii-based longline fishing. Stringent management constraints were implemented in the Hawaii longline fishery in 2001, including a ban on swordfish fishing. This reduced revenues and landings from the Hawaii longline fishery by about 32% and 45% respectively, and reduced the contribution of Hawaii's fisheries in 2202 to 60% of total U.S. Pacific islands landings. The decline in the contribution by the Hawaii longline fishery to the U.S. Pacific islands total was compensated, however, by a major expansion of the American Samoa longline fishery. The total landings from the U.S. Pacific islands amounted in 2002 to just over 40 million pounds, worth about $68 million.

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Landings and Value from Distant Water Fishing Nations in American Samoa and Guam • 2002

Port	Landings		Value	
	x 1,000 lb	No. U.S. port	Million $	No. U.S. port
Pago Pago, American Samoa, canneries and transshipment	423,324	2	251.7	1
Agana, Guam, transshipment	16,940	43	60	6

Table 3

In Guam and the Northern Mariana Islands, domestic tuna fisheries are limited, but landings, transshipment and processing of tuna catches from distant water fishing nation fleets in Guam are extremely important (*Table 3*). Tuna fishing in American Samoa was also limited until the late 1990s when domestic longline fishing expanded, growing by 2002 to rival Hawaii in terms of pounds of fish landed. American Samoa has two canneries, which process tuna caught throughout the Pacific and provide the main source of private sector employment for American Samoa and a significant employment of labor from independent Samoa. Re-provisioning of fishing vessels also adds to the revenues generated by tuna processing in this territory. The same is true in Guam where large numbers of distant water fishing nation longliners are based and transship their catches. Guam and neighboring Saipan have also seen the increasing development of airfreighting foreign-caught fresh tuna for the sashimi market in Japan and increasingly to a growing tuna and swordfish market in Europe. The development of air transshipment hubs in Guam and Saipan has also had a positive effect on the development of tuna fisheries in the neighboring Micronesian states of Palau, the Federated States of Micronesia (FSM) and the Marshall Islands, with both domestic and distant water fishing nation vessels home-porting in these islands. Pago Pago, American Samoa, and Agana, Guam, are ranked first and sixth, respectively, of all major United States ports for value of commercial landings in 2002 (*Table 3*). Honolulu, Hawaii, was ranked 12th of United States ports in 2002 for value of commercial landings, a decline from recent years due to recent restriction on the swordfish component of the Hawaii longline fleet.

Pelagic Fisheries

The Western Pacific Council was the first of the regional councils to develop a Pelagics Fishery Management Plan (FMP), promulgated in 1987, through which U.S. pelagic fisheries under federal jurisdiction are regulated. The Pelagics FMP initially addressed the regulation of foreign fishing vessels in EEZ waters surrounding the U.S. Pacific islands through fishing permits, area closures, the prohibition of drift gill net fishing

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except for experimental purposes, definition of pelagic management unit species, observer requirements and catch reporting. The plan also created a framework for the future management of pelagic fisheries within the EEZ waters of the U.S. Pacific islands.

Domestic commercial pelagic fisheries in Hawaii and American Samoa are the most developed of commercial pelagic fisheries of the U.S. Pacific islands (*Table 2*). Until the latter quarter of this century, much of the commercial pelagic catch was skipjack taken by Hawaii live bait pole-and-line vessels, which supplied a local cannery. This method of fishing has largely declined following the closure of the tuna cannery in 1984 although a small amount of skipjack is still landed for fresh consumption. The predominant pelagic fisheries in Hawaii are two handline fisheries (*palu-ahi* and *ika-shibi*), trolling and longline fishing. Of these methods, by far the most important in terms of volume and value is the longline fishery (*Table 4*). Less than 15 longline fishing vessels were active in the early 1980s in Hawaii, but this fishery targeting swordfish and tunas

Volume and Value of Finfish Landings from Hawaii-based Fisheries • 2001

Fishery	Landings (x 1,000 pounds)	Gross revenues
Longline	15,600,000	$33,000,000
Pole-and line (aku boat)	1,200,000	$1,600,000
Troll	2,600,000	$3,800,000
Handline	1,320,000	$2,300,000
Other gear	600,000	$900,000

Table 4

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expanded to about 150 vessels by the early 1990s. Prior to a recent closure of the swordfish component of the Hawaii longline fishery, Hawaii-based longliners accounted for about two thirds of U.S. swordfish production and 15% of all Pacific swordfish landings.

Handline fishing is an ancient technique developed by Pacific islanders living on atolls and small islands. It is used to catch yellowfin and bigeye tunas with simple gear and small boats. Today, there is a substantial amount of variation in fishing methods and gear employed by the Hawaii handline fleet. Handline gear is set below the surface to catch relatively small quantities of large, deep-swimming tuna suitable for sashimi markets. There are two types of pelagic handline fishing methods employed in Hawaii. The *ika-shibi* (squid small ahi) handline fishery is generally conducted at night and most fishers use a parachute sea anchor to slow the vessel's drift while fishing. Three to four handlines are set at a time. Mackerel scad is the typical bait, and the baited hook is lowered with a lead weight. A light bulb is placed in the water to attract baitfish and tuna, and the surface is chummed with chopped squid and anchovies. The daytime *palu-ahi* (chum tuna) handline method adds a weighted, retrievable bag stuffed with chum that is released at a depth of approximately 130 meters to attract tuna to the baited hooks. When a fish is caught, it is hauled aboard either manually or with hydraulics. The Hawaii offshore handline fishing grounds are primarily at seamounts and weather buoys 30-200 miles from shore. In 2001 the State of Hawaii issued 163 Commercial Marine Licenses to fishermen who identified on their license that their primary fishing method was *ika-shibi* or *palu-ahi* handline. There is no federal permit requirement for commercial handline fishing off Hawaii. Total Hawaii handline catch in 2001 was about 1.3 million pounds.

Troll fishing, which may catch a variety of pelagic species, is predominantly a recreational fishery; however, there are a few full-time commercial troll fishermen in Hawaii and pelagic handline and bottomfish fishermen may also set trolling lines en route to and from fishing grounds to augment their catch. Trolling is conducted by towing lures or baited hooks from a moving vessel using big-game rods and reels or hydraulic haulers and outriggers. Some troll vessels will also use a handline especially to target ono (wahoo) and tunas. Commercial troll fisheries target ono, mahimahi, and large yellowfin tuna. Trollers fish at grounds where water masses converge, and where underwater features create dramatic bathymetric changes, and may target fish aggregation devices and foraging seabirds. Many recreational troll fishermen in Hawaii sell surplus catch to cover trip expenses and are thus referred to as "expense" fishers. This makes the definition of commercial and recreational fishermen difficult. A 1995-1996 statewide survey of small boat fishers classified 41% of respondents as expense fishers, 28% as recreational fishers who did not sell any portion of their catch, and the remainder as full-time or part-time commercial fisheries who fish to generate personal income. Trolling is the most popular pelagic fishing method in Hawaii and has a long tradition of use by small boat recreational and commercial fishers using simple gear. Hawaii also has been the site of important innovations in big-game trolling techniques. For instance, Hawaii is known as the blue marlin trolling capital of the world, and the annual Hawaii International Billfish Tournament has been held for the past 45 years in Kona, Hawaii. Commercial trollers landed about 2.6 million lbs of pelagic fish in 2001.

The pelagic pole-and-line fishery in Hawaii primarily targets skipjack and juvenile yellowfin tuna. This fishery is also called the baitboat fishery because it uses live bait to entice tuna to bite on barbless hooks with feathered skirts. Okinawan fishermen introduced the fishery after the turn of the century, and even today

several Hawaii skippers are of Okinawan descent and several original Okinawan "sampan" style wooden boats are active today in this fishery. A steel-hulled sampan-style vessel was built in the late 1990s and has shown to be profitable despite pessimistic predictions. The major historic baiting areas used by the fishery, such as Pearl Harbor, are now closed to bait fishing, making it difficult for the remaining fleet to obtain bait in less productive Kaneohe Bay. Historically skipjack landed in the pole-and-line fishery were primarily canned, but there was and still remains an important domestic market for fresh caught skipjack in Hawaii. Currently most Hawaii catch is sold on the fresh fish market. The Hawaii-based pole-and-line fishery now has only about three active boats. In 2001, the pole-and-line fishery landed 1.2 million pounds of fish, 99% of which was skipjack tuna, generating $1.6 million in ex-vessel revenue.

Longline fishing in Hawaii had been conducted for many decades prior to the expansion of the fishery in the late 1980s. Hawaii longline vessels evolved from wooden pole-and-line tuna sampans, employing longlines made from rope and fishing mainly within 2-20 nm of the coast. At this time, this fishing style was called "flag line." By the 1930s this fishery was second only to the pole-and-line fishery in landed volume of fish and accounted for most of the yellowfin, bigeye and albacore tuna landed in Hawaii. The fishery peaked in the mid-1950s with landings exceeding 2000 tons (t) and then declined steadily through lack of investment in boats and gear until the late 1980s.

The Hawaii-based longline fishery was revitalized with the development of local markets and exports for fresh tuna on the U.S. mainland and in Japan and expansion of fishing for swordfish around the Hawaiian Islands. Participation in the longline fishery increased from 37 vessels in 1987 to 75 in 1989 and then doubled again to 156 vessels in 1991 (*Figure 2*). Further entry to the longline fishery was halted through a moratorium in 1991 under Amendment 3 to the Pelagics FMP, followed by a limited entry program to restrict effort. Landings increased rapidly, reaching 9,000 t, of which 4,400 t

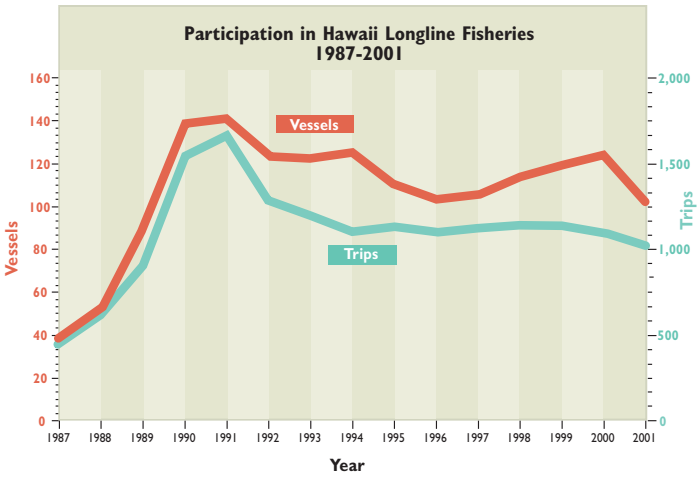

Figure 2

was broadbill swordfish, by 1991. The new entrants in the longline fishery were mostly steel hulled vessels up to 110 ft in length operated by former participants in the U.S. East Coast tuna and swordfish fisheries. These newer vessels in the fishery were also characterized by a greater reliance on sophisticated electronic gear to navigate, mark deployed longline gear and find fish. The revitalized fleet also adopted more modern longline gear, using continuous nylon monofilament main lines stored on spools, with snap-on monofilament branch lines.

Monofilament longline gear is more flexible in configuration and can be used to target various depths more easily than traditional rope longlines. Both daytime and nighttime fishing are practiced using the same monofilament system. When targeting deep-swimming bigeye tuna, 12-25 hooks are deployed between floats with lots of sag to reach as deep as 1,300 ft. When targeting swordfish, only a few hooks are deployed between floats and the line is kept relatively taut so that it stays within the first 100–300 ft of the water column. Luminescent light sticks are employed at night to attract swordfish and bigeye tuna or their prey. The longlines are baited with large imported squid. However, the swordfish segment of the longline fishery has been closed since 2001 due to concerns about the fishery's interactions with sea turtles.

In early 1991 longline fishing was prohibited within 50 nm of the NWHI to prevent interactions with endangered Hawaiian monk seals. Additional longline

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exclusion zones were established in mid-1991 through Amendment 5 of the Pelagics FMP, i.e., 50-75 nm around the MHI and within 50 nm of Guam. These closures around the MHI and Guam were adopted to prevent gear conflicts between longliners and smaller fishing boats targeting pelagic stocks.

Enforcement of the longline exclusion zones around the MHI and the NWHI is accomplished through the Council's mandatory Vessel Monitoring System policy, where local longline boats must be equipped with a satellite transponder that provides 'real-time' position updates and the track of the vessel movements. Working closely with industry, the National Marine Fisheries Service (NMFS, also known as NOAA Fisheries) and the U.S. Coast Guard, the Council implemented this mandatory Vessel Monitoring System scheme for the Hawaii longline fishery in December 1994. This was the first mandatory scheme in U.S. waters. Hawaii-based longline vessels are also required to carry onboard observers when requested by NMFS, in part, to record interactions with sea turtles, seabirds and marine mammals. *Table 5* describes the catch composition by volume and value for the Hawaii longline fishery.

Most recently, an August 31, 2003, judgment (as amended on October 6, 2003) by the federal district court for the District of Columbia vacated regulations promulgated in 2002, implementing a 2001 NMFS Biological Opinion, designed to reduce interactions between Hawaii pelagic longline fishing gear and sea turtles. However, the 2002 regulations will remain in effect until the Council develops replacement regulations by April 1, 2004. It is expected that NMFS and the Council, will develop and implement new regulations by that date. The current (through April 1, 2004) regulations prohibit swordfish longline fishing north of the equator, all Hawaii-based longlining in an area south of the Hawaiian Islands during April and May, and the possession or landing of more than 10 swordfish per fishing trip by longline vessels fishing north of the equator, among other measures. The new management regime for the fishery will be designed to allow a sustainable fishery while not jeopardizing the continued existence of affected sea turtles or other threatened or endangered species.

Another recent regulation that has had a major impact on the Hawaii-based longline fishery was the

Catch Composition of Hawaii Longline Fishery by Volume and Value • 2001

Species	Catch (× 1,000 lbs.)	Revenue (× $1,000)
Blue marlin	879	730
Striped marlin	775	845
Swordfish (round weight)	485	1,193
Other billfishes	299	242
Mahimahi	530	662
Ono (wahoo)	388	563
Opah (moonfish)	756	930
Sharks (round weight)	327	119
Other	395	529
Subtotal non-tuna	4,834	$5,813
Albacore	2,802	3,222
Bigeye	5,217	18,208
Bluefin	2	10
Skipjack	466	238
Yellowfin	2,233	5,516
Subtotal tuna	10,720	$27,194
TOTAL	**15,554**	**$33,007**

Table 5

American Samoa Total Landings by Domestic Longline and Troll Fisheries • 2002

Species	Landings by Fishing Sector (lb.)	
	Longline	**Troll**
Skipjack tuna	509,213	10,803
Albacore	13,103,961	0
Yellowfin tuna	1,067,481	11,781
Kawakawa	0	93
Bigeye tuna	431,713	0
Misc. tunas	396	0
Mahimahi	85,831	654
Black marlin	2,248	0
Blue marlin	74,216	0
Striped marlin	3,850	0
Wahoo	357,886	351
Sharks	6,019	215
Swordfish	37,101	0
Sailfish	7,060	0
Spearfish	3,033	0
Moonfish	6,759	0
Oilfish	731	0
Pomfret	2,682	0
Others spp	4,739	770
TOTAL	**15,704,919**	**24,667**

Table 6

prohibition of shark finning. The U.S. Congress and the State of Hawaii adopted legislation in 2000 banning shark finning because of concerns that the practice was wasteful, and that the increasing market demand for fins may endanger pelagic shark populations. Prior to the ban, up to 60,000 sharks, primarily blue shark, were finned and the carcasses discarded by the Hawaii-based longline fleet. However, a stock assessment conducted jointly between NMFS and Japanese colleagues showed that North Pacific blue sharks stocks are healthy, and are fished well below the maximum sustainable yield.

Troll fishing continues to be the most commonly practiced method for commercially fishing large pelagics in Guam and the Northern Marianas, while longline fishing, principally for albacore, has dramatically increased in American Samoa since 1995. In mid-1995 four vessels began longlining in American Samoa. By 1997, a total of 33 vessels had longline permits, and the fishery grew rapidly until 2001. In 2001, a total of 62 American Samoa permitted longline vessels were active and reported total landings of over 8.1 million pounds. In 2002, a total of 60 active longline vessels in American Samoa reported landings of over 15.7 million pounds. The total landings of all pelagic species in American Samoa in 2001 was an increase of 339% from 2000, and the total landings of all pelagic species in 2002 was an increase of over 93% from 2001. Of the 2002 domestic total landings of pelagic species in American Samoa, longlining comprised 99.8% while trolling took less than 0.2% (*Table 6*).

A unique feature of the American Samoa fishery is the bimodal fleet, split between large (>50ft) conventional monohull longline vessels and small outboard powered locally built aluminum *alia* catamarans, from which longline gear is set and hauled manually. The fishery began based on *alias*, but the recent expansion was a result of the entry of large conventional longline vessels into the fishery. The Council developed two management measures to ensure the productivity of the *alia* pioneer fleet in the face of entry from larger monohull vessels. The first of these was the development of 50 nautical mile area closures to all pelagic fishing vessels >50 ft around the American Samoa islands, which minimized competition between the two fleet segments and allocated nearshore areas to the less mobile *alias*. The second was a limited entry program, which caps effort, but allows American Samoa fishermen to upgrade *alias* to larger monohulls.

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Pelagic fisheries of the Territory of Guam include primarily U.S. distant-water purse seiners and foreign longliners that fish outside of the U.S. EEZ and transship through Guam and small primarily recreational trolling boats that fish only in local waters around Guam and the Commonwealth of the Northern Mariana Islands. In 2001 there were a total of 375 troll and charter vessels in Guam landing approximately 757,000 pounds sold for $670,000. The catch was comprised primarily of skipjack tuna, mahimahi, and wahoo. The number of troll vessels operating in Guam has steadily increased from 119 in 1980 to 438 in 1998 and has slightly decreased thereafter to 375 troll vessels in 2001.

Trolling is the most common fishery in the Commonwealth of the Northern Mariana Islands, with bottomfishing and reef fishing also conducted. The main product is skipjack tuna. Yellowfin and mahimahi are targeted to a lesser degree. All production from this domestic commercial fishery is consumed locally. In 2001 there were 148 active troll and charter vessels in the Northern Mariana Islands landing about 143,114 pounds of pelagic species of which 70% was skipjack tuna and 30% was mahimahi and dogtooth and yellowfin tuna. The fish generated an estimated $286,488 in ex-vessel revenue. No large-scale longline or purse seine activity occurs around the Northern Mariana Islands.

Most pelagic stocks and landings are significantly greater than demersal fisheries in all parts of the Western Pacific Region, especially in Hawaii (*Table 2*). The tropical tunas (skipjack, yellowfin, bigeye) represent a substantial resource for the entire Western Pacific Region. Total catches of skipjack alone in the Western Pacific (including Eastern Indonesia and the Philippines) amount to almost 1,000,000 mt/yr of which most is taken by fleets of purse seiners from the United States, Japan and the Philippines. Results of studies on the biology of the various pelagic stocks suggest that the tropical tunas are extremely productive populations, with rapid growth rates and more or less constant recruitment to the population over a wide range of their distribution. It is thought that present effort levels are still below those that would generate maximum sustainable yields.

Coral Reef Ecosystems

The Western Pacific Council's 2001 Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region is the first ever ecosystem-based plan for fisheries developed in the United States. It incorporates many of the principles and policies recommended by the National Marine Fisheries Service's Ecosystem Principles Advisory Panel. The goal of the FMP is to establish a management regime for the entire Western Pacific Region that will maintain sustainable coral reef fisheries while preventing adverse impacts to stocks, habitat, protected species or the ecosystem. To achieve this goal, the FMP implements several management measures, including: (1) the designation of zoned Marine Protected Areas (MPAs) for coral, (2) permit and reporting requirements to fish in designated low-use MPAs (reporting of fisheries information in non-MPA areas will continue to be collected through locally administered monitoring systems), and if needed, a general permit program for all EEZ reef fisheries, and (3) a prohibition on non-selective/destructive fishing gears and conditions on the types and uses of allowable gears.

The central feature of the Coral Reef Ecosystems FMP is adaptive management, which recognizes the uncertainty, changing conditions and resilience associated with coral reef ecosystems. Pacific island management systems for coral reef ecosystems have allowed Pacific islanders to survive for millennia by coexisting with coral reef resources and are best viewed as adaptive responses that have evolved over time, not as mere traditions.

Coral reef habitat covers an estimated 6,120 nm^2 of the shallow ocean bottom around U.S. Pacific Island areas served by the Council. Nearshore fisheries of the Western Pacific Region include a wide variety of reef and lagoon species and large and small pelagics fishes found within lagoons or near reef margins. A variety of methods are employed in coral reef fisheries including hand harvesting, hook-and-line, spears and a variety of nets and traps. The monitoring and regulation of nearshore fisheries is mainly the responsibility of State or territorial fisheries administration, although there are some 4,200 nm^2 of lightly fished coral reef habitat that lies within the federal waters of the Council's jurisdiction. *Table 7* lists the 2002 volume of estimated domestic coral reef fish landings in the U.S. Pacific islands by area.

Nearshore resources are caught for recreation and subsistence purposes and for commercial sales. Categorizing fishing activity into one of these different activities is extremely difficult in the Western Pacific Region. People may have regular employment but increase their earnings by occasional sales of fish when recreational or subsistence catches are more than required. In the Pacific islands, nearly every person is a potential fisherman and every village is a potential landing site. Even in Hawaii, a significant volume of the recreational catch is sold to the public along the roadside. This is another essential difference between the Western Pacific Region and other U.S. locations, where commercial and recreational fishermen are strongly polarized and the commercial fishing community actively discourages fish sales by recreational fishermen.

Estimated Landings of Western Pacific Coral Reef Ecosystem FMP Management Unit Species • 2002

Island Area	Landings (lbs)
American Samoa	19,750
Guam	177,030
Hawaii	866,860
Northern Marina Islands	179,090
TOTAL	**1,242,730**

Table 7 Source: WPacFIN

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Throughout the Western Pacific Region, fishery administrators at the State, territorial and commonwealth level are actively developing management strategies to minimize the potential for resource depletion and habitat degradation. The Territory of Guam recently established over 20% of its nearshore waters as no-take MPAs. The Territory of American Samoa has banned the use of fishing with SCUBA, and the Commonwealth of the Northern Mariana Islands has banned the use of all types of lay gill nets. The State of Hawaii has increased the minimum size for many reef fish and is also developing new conditions for the use of lay gill nets. In addition, the Hawaii State Legislature recently introduced several bills to establish Marine Reserves in up to 20% of the marine waters around the State of Hawaii. However, the bills were not approved by the House and Senate committees, in part due to a lack of public participation in their development.

With the assistance of federal partners, local fisheries administrations are also increasing fisheries research and monitoring programs to evaluate the effectiveness of existing regulations and management decisions. Fisheries administrations in the Western Pacific Region possess some of the longest coral reef fisheries data sets and continue to improve the collection of fisheries information, including catch and effort data from recreational and subsistence sectors. MPA effectiveness studies are now being conducted throughout the region, and ecosystem assessment programs have recently been initiated to monitor the long-term health of coral reefs and reef associated communities. Collectively, these new programs aim to evaluate the effectiveness of existing fisheries management measures and provide scientific data to support and establish new management initiatives.

Crustacean Fisheries

Lobster was a traditional source of food for Native Hawaiians and was sometimes used in early religious ceremonies. After the arrival of Europeans in Hawaii, the lobster fishery became the most productive of Hawaii's commercial shellfish fisheries. The commercial lobster catch in 1901 was reported to be 131,200 lbs. The majority of catch at that time was probably composed of the green spiny lobster, a nearshore species. Lobsters were taken with nets set around rocks, snared with a pole to which a noose was attached or captured by hand. A rapid and substantial increase in Hawaii's population during the first decades of the twentieth century resulted in heavy fishing pressure and depletion of lobster resources adjacent to the more populated areas of the MHI. By the early 1950s the commercial catch of green spiny lobsters around the MHI had dropped by 75% to 85%. The depletion of the fishery resources in nearshore areas of the MHI encouraged Hawaii's fishermen to search for alternative grounds.

A NWHI lobster fishery was developed in the late 1970s. By then several commercial vessels, relocated from areas such as the U.S. Pacific Northwest where crustacean overfishing was occurring, began full-scale lobster trapping in the NWHI. A number of smaller, multi-purpose boats also began fishing for spiny lobsters in the NWHI, combining that operation with bottomfish fishing. By the mid-1980s the NWHI lobster fishery was Hawaii's most lucrative fishery.

Changing gear from wire to plastic traps led to significant catches of slipper lobster and an increase in fishing efficiency. From 1985 to 1987 the fishery targeted and largely depleted the population of slipper lobsters. In 1990, lobster catch rates dramatically declined, likely due to a climate-induced change in oceanic productivity throughout the NWHI, which also affected the abundance of reef fish, seabirds and Hawaiian monk seals. The decrease in lobster catch prompted the Western Pacific Council to establish a limited access program and fleet wide seasonal harvest quotas that significantly altered fishing operations. Vessels concentrated on trapping lobsters on the banks around Necker Island, Gardner Pinnacles and Maro Reef during the derby-style fishing season. From 1992 to 1997 Necker Island accounted for 48% to 64% of the total effort. In 1998, the quota was allocated among four fishing areas to prevent localized depletion of the lobster population at the most heavily fished banks and to encourage fishers to broaden the geographical distribution of their effort.

The NWHI lobster trap fishery is unique in the Western Pacific Region where other common spiny lobster species normally will not readily enter fish traps. Under the Western Pacific Council's Crustacean Fishery Management Plan, implemented in 1983, traps deployed in the NWHI lobster fishery must have escapement panels to allow the exit of juvenile lobsters. In the same year, the Council also amended the Crustacean FMP to specify the maximum dimensions of the trap funnel entrance, to minimize the risk the traps posed to protected monk seals in the NWHI. There were concerns that the traps may elicit the curiosity of monk seals, especially the pups, who might place their heads in the trap funnel, become trapped and drown.

The lobster harvest guideline is an example of implementation of the precautionary approach to fisheries management, as it allows no more that a 10% risk of overfishing to set the total exploitable population and then allocates 13% of that as the harvest guideline. Initially, a minimum size limit of 5 cm tail width for spiny lobsters and 5.6 cm for slipper lobsters was

established for the lobster fishery, along with a ban on the retention of berried females. However, observations on the gross mortality of discarded lobsters, both on deck and through predation, led to a Council decision in 1996 to permit a "take all" fishery in which all lobsters brought on deck are counted against the annual quota. The Hawaii lobster fishery landed 261,000 pounds with an ex-vessel revenue of $1.2 million in 1999, which was the last year the fishery was active (*Table 2*).

The majority of the vessels participating in this fishery voluntarily deployed satellite VMS through which their location is tracked and their daily catches reported. This allows managers to monitor the progress of the fishery through "real time" reporting of catches and give immediate notice when the annual quota is reached.

While calculating the year 2000 estimates of exploitable population of lobsters in the NWHI, using the same analytical procedures used to estimate exploitable populations in 1998 and 1999, NMFS scientists expressed alarm at the increasing level of uncertainty in their computations. The scientists also noted a lack of appreciable rebuilding of lobster populations, despite significant reductions in fishing effort throughout the NWHI. Given the shortcomings in understanding the dynamics of the NWHI lobster populations, the increasing uncertainty in model parameter estimates and the lack of appreciable rebuilding of the lobster population, in 2000 the Council recommended that NMFS close the NWHI lobster fishery as a precautionary measure, until the stock status is understood.

The NWHI Coral Reef Ecosystem Reserve was established by Executive Order 13178 of December 4, 2000, and Executive Order 13196 of January 18, 2001. The NWHI Reserve boundary extends 3-50 nm around the NWHI except at Midway Atoll where the NWHI Reserve boundary starts at the outer boundary of the Midway Atoll National Wildlife Refuge and extends to 50 nm. The process to establish a proposed NWHI Sanctuary is underway and will consider a range of reasonable management alternatives.

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Bottomfish and Seamount Fisheries

Most bottomfish grounds in American Samoa, Guam, the Northern Mariana Islands and the MHI are within the 0-3 nm zone, although there are banks and seamounts such as Penguin Bank in the MHI that lie within or extend into federal waters. In addition, the NWHI represents a substantial area of bottomfishing grounds within Council's jurisdiction.

The Hawaii bottomfish fishery is a hook-and-line fishery that targets a range of snappers and groupers that live on the outer reef slopes, seamounts and banks of the MHI and NWHI at depths of between 50 to 200 fm. Bottomfish fishing was a part of the economy and culture of Native Hawaiians long before European visitors arrived. Native Hawaiians harvested the same deep-sea bottomfish species as the modern fishery and used some of the same specialized gear and techniques employed today. European colonization of the Hawaiian Islands during the early nineteenth century and the introduction of a cash economy led to the development of a local commercial fishery. By the turn of the century Japanese immigrants to Hawaii dominated the bottomfish fishery using wooden-hulled sampans propelled by sails or oars. The bottomfish fishing gear and techniques employed by the Japanese immigrants imitated, with slight modifications, those traditionally used by Native Hawaiians. During the early years of the commercial bottomfish fishery, vessels fished at grounds around the MHI. The fishing range of the sampan fleet increased substantially after the introduction of motor powered vessels in 1905. Fishing activity was occurring around the NWHI as early as 1913. Within a few years more than a dozen sampans were fishing for

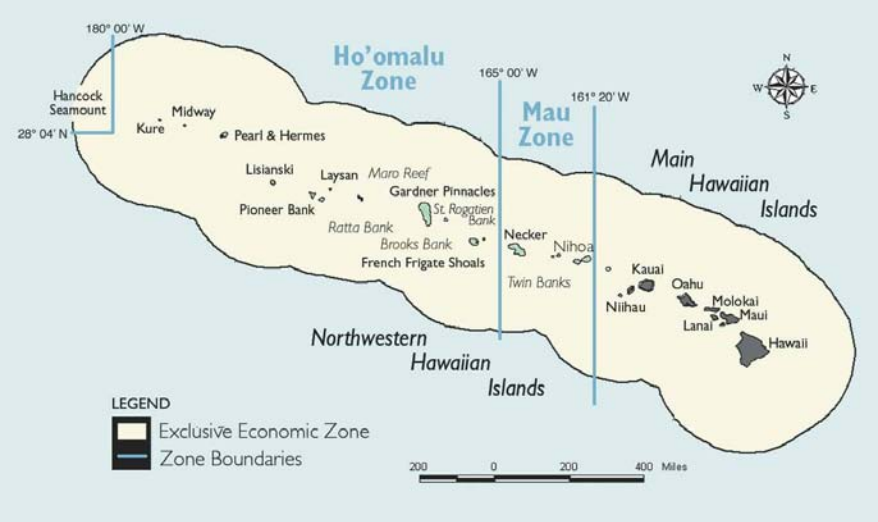


Figure 3 The Mau, Ho'omalu, and Main Hawaiian Islands management zones for Hawaii bottomfish fishing.

bottomfish around the NWHI. During World War II the bottomfish fishery in Hawaii virtually ceased operations but recommenced shortly after the war ended. The late 1940s saw as many as nine vessels fishing around the NWHI, but by the mid-1950s vessel losses and lower fish prices reduced the number of fishery participants. During the 1960s only one or two vessels were operating around the NWHI. There was renewed interest in bottomfish fishing in the NWHI in the late 1970s following a collaborative study of the marine resources of the region by state and federal agencies. By 1987, a total of 28 vessels actively fished for NWHI bottomfish, with a dozen fishing full time.

Bottomfish are caught both by commercial and recreational fishermen around the MHI and by commercial fishermen in the NWHI. The size of the recreational catch around the MHI is unknown and is confounded not only by non-reporting but also by the blurring of the distinction between commercial and recreational fishermen.

The Bottomfish and Seamount Groundfish FMP was implemented in 1983. It prohibited destructive fishing techniques, including explosives, poisons, trawl nets and bottom-set gillnets; established a moratorium on the commercial harvest of seamount groundfish stocks at Hancock Seamount; and implemented a permit system for fishing for bottomfish around the NWHI.

A limited entry scheme is in effect for bottomfishing in the NWHI whereas bottomfish stocks in the MHI are open to all fishermen. In the MHI approximately 80% of the bottomfish habitat lies in state waters. The State of Hawaii has implemented a series of area closures around the MHI and recreational bag limits to address the problem of local depletion of bottomfish. In 1989 the Council developed regulations that divided the NWHI into two fishing grounds: the Mau and Ho'omalu Zones (*Figure 3*). Access to the Mau Zone is limited to 10 permit holders, two of which are reserved for indigenous communities through a Community Development Program. Available permits are issued to fishermen based on past participation in the MHI and/or NWHI bottomfish fisheries. Access to the more distant Ho'omalu Zone is limited to seven vessels. Entry to the Ho'omalu Zone is through accumulation of points through fishing in the MHI or Mau Zone. Fishermen who have permits to fish in the Ho'omalu zone are then restricted to fishing in this zone and must meet minimum landing requirements to remain in the fishery. The limited access programs for the Ho'omalu and Mau Zones were established in 1988 and 1999 respectively.

The NWHI Coral Reef Ecosystem Reserve was established by Executive Orders in 2000 and 2001. The process to establish a proposed NWHI Sanctuary is underway and will consider a range of reasonable management alternatives related to the bottomfish fishery.

In addition to the deep-slope fisheries in the MHI and NWHI, a trawl and bottom longline fishery targeting alfonsin at the southeast Hancock Seamount in the NWHI and in the Emperor Seamount Chain was started by Russian and Japanese fishing vessels in the late 1960s. After 10 years of large catches, overfishing caused the fishery to collapse. A moratorium on the harvest of alfonsin on the Hancock Seamounts has been in effect since 1986 in an effort to rebuild the stock.

The moratorium is in effect until 2004 and may be extended. Periodic reviews of the stock indicate that no recovery has occurred.

A Guam bottomfish closure was recently recommended by the Council and is being reviewed. Vessels over 50 feet will be prohibited from targeting bottomfish within 50 miles around Guam. The closure will help control fishing effort at offshore seamounts and allow the traditional small vessel fishery to continue to use resources. The measure also requires federal permits and reporting for larger vessels. The Council is now considering management options for bottomfish resources in the Northern Mariana Islands.

Precious Coral Fisheries

The Western Pacific Council's Precious Corals FMP was approved in 1980 and regulations for the fishery were promulgated in 1983. The plan established a permit requirement, harvest quotas for separate beds, a minimum size limit for pink coral, gear restrictions, area restrictions and fishing seasons. In 1991 an amendment to the FMP defined a bed as overfished with respect to recruitment when the total spawning biomass (all species combined) has been reduced to 20% of its unfished condition. *Figure 4* shows the location of Hawaii's precious coral beds.

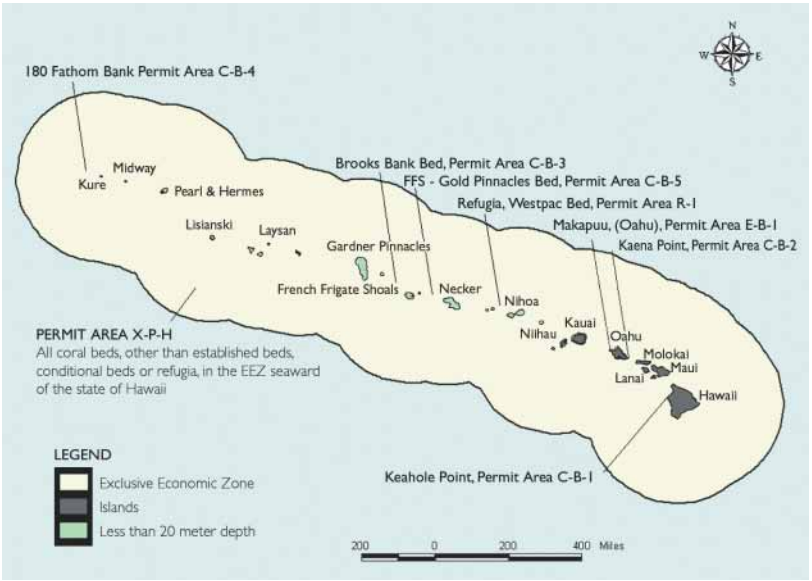
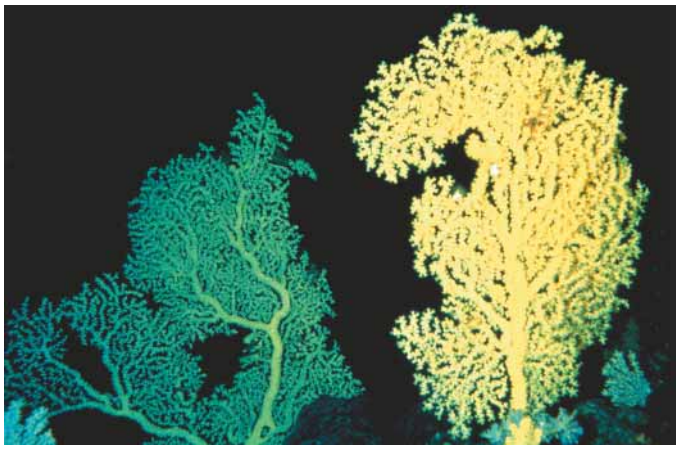


Figure 4 Precious coral beds in Hawaii.



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Gold coral.

In 1965 Japanese coral fishermen discovered a large pink coral bed (*Corallium* spp.) near the northwestern end of the Hawaiian Archipelago. Intermittently over the next two decades, dozens of foreign vessels employed tangle-net dredges to extract precious corals in waters around the NWHI. During the 1980s, Japanese and Taiwanese coral vessels frequently fished illegally in the U.S. EEZ around the NWHI. Poaching stopped in these areas in the late 1980s because the remaining precious corals could not sustain an economically viable fishery.

The Hawaii precious coral fishery includes two distinct sectors. One sector extracts deep-water (400–1,500m) pink, gold and bamboo corals. This fishery historically employed dredges and tangle nets to extract the precious coral, but the Council now requires selective methods such as remotely operated vehicles and submersibles. In 1966 researchers located a small pink coral bed off Makapuu, Oahu, in the MHI. Over the next three years, a small group of fishermen harvested this bed using tangle net dredges. By 1969 Hawaii's precious corals industry was producing about $2 million in retails sales, partly from the sales of pink coral jewelry imported from Taiwan and Japan. Starting in 1973, Maui Divers of Hawaii, Inc., adopted the use of a manned submersible to

Volume and Value of Black Coral Landings in Hawaii

Year	Extracted (lb)	Sold (lb)	Value ($)
1990	2,349	2,169	31,575
1991	2,305	2,250	35,080
1992	2,398	2,328	46,560
1993	864	769	15,380
1994	4,354	4,209	84,180
1995	6,017	5,912	122,765
1996	4,865	1,703	41,325
1997	1,520	415	10,394

Table 8

commercially extract pink, gold and bamboo coral at the Makapuu bed. These operations were discontinued in 1978 due to high operating costs. In 1988 the domestic fishing vessel *Kilauea* received a federal experimental fishing permit to collect precious corals at Hancock Seamount, but the operation was soon discontinued. American Deepwater Engineering received a federal permit to collect precious corals in waters around Hawaii, using two one-person submersibles. In 2000, American Deepwater Engineering collected precious corals at the Makapuu bed and in the Exploratory Area of the EEZ around the MHI. New precious coral beds continue to be discovered in the Hawaiian Islands archipelago, with new beds identified in both the MHI and NWHI during 2002 and 2003.

The second sector of the Hawaii precious coral fishery, which occurs predominantly in state waters, involves hand-collecting black coral using SCUBA divers at depths of 30–100m. Black coral has been collected for centuries as a charm and a medicine. Native Hawaiians used black coral medicinally to treat various respiratory and childhood diseases and may have collected the coral with hook-and-line. The commercial extraction of black coral began in the late 1950s when sport divers discovered beds of *Antipathes dicomata* and *A. gradis* off Maui. A cottage industry producing curios and black coral jewelry developed. Since the inception of the black coral fishery in Hawaii in the late 1950s fewer than ten individuals have been active in the fishery at any one time. Harvest levels of black coral in Hawaii have fluctuated widely over the past four decades reflecting changes in demand. *Table 8* lists the volume and value of black coral landings in Hawaii. During the 1970s the State of Hawaii drafted a regulation requiring a minimum height of 48 inches, the estimated minimum size for maintaining maximum sustainable yield. In the 1990s the state promulgated regulations to implement the size restriction. Between 1990 and 1997 the annual harvest of black coral in Hawaii ranged between 846-6,017 lb, with an annual average of 3,084 lb.

The recently established NWHI Coral Reef Ecosystem Reserve prohibits precious coral fishing within the Reserve boundary. The process to establish a proposed NWHI Coral Reef Ecosystem Sanctuary is underway and will consider a range of reasonable management alternatives related to precious coral fishing.

Much of the basic biology of deep-water precious corals (particularly gold coral), as well as their distribution, is poorly understood. Furthermore, there is controversy over the unknown degree of adverse effect a NWHI precious coral fishery would have on populations of endangered Hawaiian monk seal. Although monk seals have been observed preying on eels found among precious coral colonies, the importance of eels in the monk seal diet is unknown.

Indigenous Programs

Indigenous cultures in the Western Pacific developed in isolation over long periods of time. The earliest evidence of settlement in Samoa dates to 3,600 years ago, in Guam and the Mariana Islands to 3,100 years ago, and in Hawaii 1,700 years ago. These earliest travelers brought a suite of traditions and beliefs that supported an island lifestyle — a culture dependent on the oceanic environment to meet their nutritional and other needs. Wise natural resource management ensured survival of the culture. These values continue to be nurtured and encouraged by the Council through its indigenous program, which seeks to address the right of the aboriginal people of the U.S. Western Pacific to demonstrate and exercise their traditional and customary practices.

The 1996 re-authorization of the Magnuson-Stevens Act confirms these unique characteristics by stating, "Pacific Island Areas contain unique historical, cultural, legal, political, and geographical circumstances which make fisheries resources important in sustaining their economic growth." New provisions contained within the Act allow for establishment of Western Pacific Community Demonstration Projects, Community Development Programs, and Pacific Islands Area (foreign) Fishery Agreements.

The goals of the Demonstration and Development Programs are to provide greater access for native communities to their fishery resources. In addition to providing greater access, capacity is now being developed in native communities to use federal programs effectively and efficiently to advance their customary, traditional and cultural practices. Grant writing, project planning and monitoring, and community organizing and mobilization are skills now being fostered.

The Magnuson-Stevens Act recognizes that the U.S. territories and commonwealth in the Western Pacific Region have little in the way of economic opportunities, compared to the mainland. Consequently, the Act permits territorial and commonwealth governments to request that the Department of State enter into negotiations with distant water fishing nations wishing to fish in EEZ waters around American Samoa, Guam and the Northern Mariana Islands to develop Pacific Islands Area Fishery Agreements. A unique feature of this arrangement is that all the revenues from the fishing agreement, including fines and penalties, accrue to the territorial government.

Priorities for the Future

International Management

The Western Pacific Council's role in the multilateral management of the highly migratory pelagic stocks in the EEZ and adjacent high seas of the Western Pacific Region has been significant and is likely to increase in the future.

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The 2nd International Fishers Forum was held in Honolulu in 2002.

The Western Pacific Council assisted in hosting four of the Multilateral High-Level Conferences in Honolulu, which led towards the establishment of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Central and Western Pacific Region (Western and Central Pacific Fisheries Convention). Developed to be consistent with the 1982 United Nations Convention on the Law of the Sea and follow the framework of the United Nations Implementing Agreement, this Convention was adopted on September 4, 2000, to establish a regional mechanism for the conservation and management of highly migratory fish stocks in the central and western Pacific Ocean. The Convention provides for the establishment of an international fishery commission to implement the provisions of the Convention. The Council participates in Preparatory Conference meetings, convened to lay the groundwork to establish the Commission. Specifically the Preparatory Conference is to establish the organizational and financial framework for the new Commission and its subsidiary bodies, as well as facilitate the future work of the Commission. The Preparatory Conference will continue until the Convention enters into force in mid 2004. The Convention applies to all species of highly migratory fish stocks within the Convention Area (defined as all fish stocks of the species listed in Annex I of the 1982 Convention occurring in the Convention Area and such other species of fish as the Commission may determine). Conservation and management measures under the Convention are to be applied throughout the range of the stocks or to specific areas within the Convention Area, as determined by the Commission.

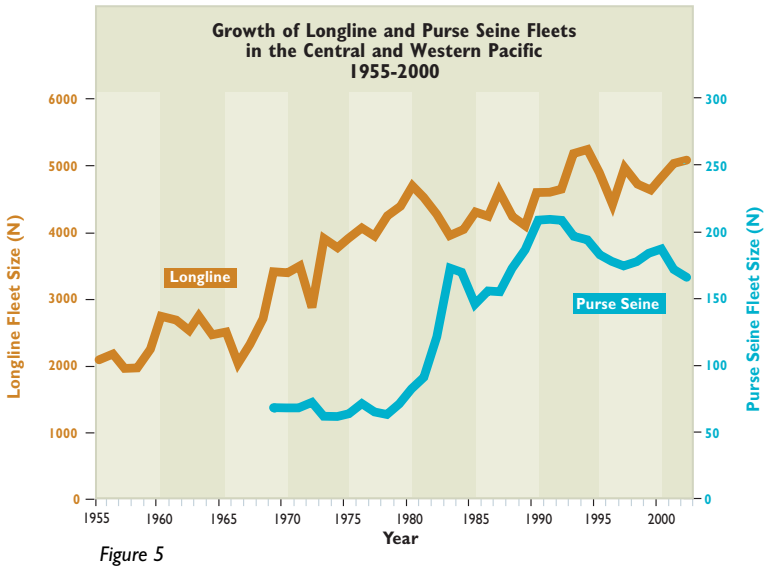

Figure 5

In addition to American Samoa, Guam, Hawaii, and the Northern Mariana Islands, there are many other nations and territories in the western Pacific, each with an EEZ and with different political affiliations. The 14 independent Pacific Island nations are members of the South Pacific Forum, which also includes Australia and New Zealand. The secretariat for the Forum is based in Fiji, with its fisheries administration, the Forum Fisheries Agency in the Solomon Islands. The Forum Fisheries Agency was established to negotiate access agreements by foreign fleets for the Forum member countries, to administer the revenues accruing from these agreements, and to provide a platform for managing tuna fisheries in the EEZs of member countries. Forum member countries and other Pacific Islands may also negotiate bilateral agreements for access to their EEZ waters.

The Forum Fisheries Agency countries plus the U.S. flag territories, French territories and the UK territory of the Pitcairn Islands, together with membership by Australia, New Zealand, France and the U.S., form the South Pacific Conference. The Conference secretariat is the Secretariat of the Pacific Community, a technical, research and development assistance organization based in New Caledonia. The Secretariat of the Pacific Community's Oceanic Fisheries Programme (OFP) conducts research and monitoring of highly migratory pelagic fisheries and publishes regular summaries of the catches of different domestic and distant water fishing nation tuna fishing fleets the western Pacific. The OFP has also been the lead agency for tuna stock assessment and biological research in the western Pacific region for the past 20 years, conducting major tagging projects on the three tropical tunas and on albacore. Recent developments within the OFP include an observer project to monitor catches and deployment of in-country port samplers throughout the Pacific.

Pelagic fisheries management requires the Council to interact frequently with both the Forum Fisheries Agency and the Secretariat of the Pacific Community, and staff members from both organizations have been or are currently members of the Western Pacific Council's Scientific and Statistical Committee and Plan Teams.

There are several tuna fishing fleets in the western Pacific, such as pole-and-line boats in the Solomon Islands and Fiji, and a number of expanding longline fleets in countries such as Tonga, Fiji, French Polynesia and the Federated States of Micronesia. Most of the commercial landings of tuna in the western Pacific, however, are currently taken by purse seine and longline fleets from metropolitan countries on the Pacific rim, namely the United States, Japan, Korea, Taiwan, Philippines and the Republic of China, i.e., the distant water fishing nations (*Figure 5*).

The management of Pacific tuna and other highly migratory species is complex at the international level and involves a number of different agencies within the region. The complexity becomes more labyrinthine since the Melanesian Island of Vanuatu is also a member of the body that manages tuna in the Eastern Pacific, the Inter-American Tropical Tuna Commission, due to flag-of-convenience registration of Eastern Pacific purse seiners. The Western Pacific Council is, however, in a prime position to lead U.S. pelagic fisheries management in the western and central Pacific through regular interaction with the various countries and organizations involved in the region's pelagic fisheries.

The Council has also been active in a broader ecological sense in the international arena, because of its interest in protected species management. It hosted a

major international workshop on blackfooted albatross population dynamics in 1998 and a major regional research and management workshop for turtles in the central and western Pacific in 2002. The Council has also entered into a formal arrangement with the South Pacific Regional Environment Programme to build in-house capacity for sea turtle conservation activities. The Programme is a regional organization established under the auspices of the United Nations Environmental Program. It draws its membership from the governments and administrations of the Pacific region and is based in Apia, Samoa. The Council is also developing similar linkages with the Southeast Asian Fisheries Development Center and its turtle conservation program. The Center is one of the agencies serving Southeast Asia under the umbrella of the Association of Southeast Asian Nations.

The Western Pacific Council has assisted in hosting several international meetings. This includes a 2000 international conference on marine debris, a large volume of which originates from fishing activity by domestic and foreign trawlers in the North, and the Second International Fishers Forum in 2002, the second in an international series of meeting for fishermen on minimizing seabird and sea turtle bycatch in longline fisheries.

Bycatch of Protected Species — Longline Fisheries

The Hawaiian monk seal is a tropical seal endemic to the Hawaiian Islands. The species was designated as depleted under the Marine Mammal Protection Act in 1976, following a 50% decline in beach counts between the late 1950s and mid 1970s. This species was also listed as endangered under the Endangered Species Act in 1976. Critical habitat for monk seals was designated in 1988 from beaches to a depth of 20 fathoms (121ft, 37m) around breeding islands and at Maro Reef. About 1,200-1,450 seals are confined mostly to the NWHI, but a population of seals in the MHI is growing.

The potential interaction of monk seals and fisheries was addressed by the Council, and the mitigation effort appears to have been successful. Evidence of

Dr. James P. McVey, NOAA Sea Grant Program

interactions between seals and the longline fishery began to accumulate in 1990, with the incidence of three hooked seals and 13 unusual seal wounds thought to have resulted from interactions. In October 1991, the Council established a permanent Protected Species Zone, where pelagic and demersal longline fishing is prohibited, extending 50nm around the NWHI and including a 100-mile-wide corridor connecting the islands. Subsequent shore-based observations of seals and observer records suggest that interactions ceased after establishment of the Protected Species Zone.

Depredation (stealing catch from hook and line gear) by dolphins and small toothed whales (protected under the Marine Mammal Protection Act) is an emerging issue in the Western Pacific Region. The Council will work with the fishing industry, government and environmental organizations to minimize these interactions.

Seabird interactions with fisheries are also of concern. Available estimates for total albatross mortality in North Pacific pelagic longline fisheries, along with population modeling experiments on the black-footed albatross, highlight the concern that mortality in longline fisheries threatens the existence of black-footed albatrosses, and may pose a significant threat to the other North Pacific albatross species. In the past, Hawaii pelagic longline fisheries resulted in the annual mortality of approximately 3,000 Laysan and black-footed albatrosses. However, changes in regulations have significantly reduced the fleet's albatross bycatch. As a result of these changes to the Hawaii longline fleet, the annual seabird mortality in the Hawaii longline fishery is currently estimated to be an order of magnitude lower than previous levels. However, the mortality of albatrosses in the North may not have been fully

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resolved because much of the former Hawaii-based swordfish fleet relocated to ports based in California where there are no seabird mitigation requirements and possibly higher rates of black-footed albatrosses mortality due to the higher abundance of this species at this fleet's fishing grounds.

Since the adoption of regulations designed to reduce seabird interactions in the Hawaii longline fleet, new cooperative research has been conducted in Hawaii longline fisheries on methods designed to minimize seabird capture. Some of the tested seabird mitigation methods show significant promise for both nearly eliminating seabird mortality and being commercially viable.

Sea turtle mortality in pelagic longline fisheries is also of concern, as fishery intereactions are a source of mortality for some Pacific and Atlantic populations of loggerhead and leatherback sea turtles. As would be expected for long-lived species with low adult mortality rates and delayed maturity, sea turtles are not expected to be able to sustain significant increases in adult or juvenile mortality above natural levels. Only limited quantitative information on interactions between sea turtles and longline fisheries is available, and there is insufficient information to enable modeling of most sea turtle populations due to large gaps in understanding of the biology and ecology of sea turtles.

Some species of sea turtles (primarily loggerheads, leatherbacks, and olive ridleys) have been incidentally captured by pelagic longline vessels. Green turtles are also caught in Pacific Ocean pelagic longline fisheries, but in relatively low numbers. Between 1994 and 1999 in the Hawaii-based longline fishery, there were 0.069 turtle interactions per 1,000 hooks. These estimates, however, were based on low onboard observer coverage averaging 4.3% of trips.

Recent changes in regulations due to concerns over interactions with sea turtles closed the Hawaii swordfish fishery, placed restrictions on the tuna fleet, increased observer coverage to 20% and have significantly changed the Hawaii fleet's effort, spatial distribution of effort and amount of turtle bycatch. Turtle bycatch has decreased to 0.002 captures per 1,000 hooks, which is an approximately 90% reduction from previous levels.

Genetic information has been examined to understand what turtle populations are most likely to be affected by the Hawaii longline fishery. Results indicate that these populations include juvenile loggerheads originating from nesting aggregations in Japan, adult leatherbacks originating primarily from western Pacific nesting aggregations (from Indonesia, the Solomon Islands and Papua New Guinea) with a minor component from Mexico and Costa Rica, and olive ridleys originating primarily from the eastern Pacific, with a smaller component from the western Pacific, and green turtles from the eastern Pacific with a smaller component from Hawaii.

Reducing the incidental catch of turtles and seabirds by the U.S. Pacific fisheries will not, in and of itself, significantly reduce the mortality on these species. The Hawaii longline fleet is a small component of total pelagic and demersal longline fishing effort in the North Pacific and represents about 2.7% of the pelagic longline hooks deployed in the entire Pacific Ocean each year. The U.S. pelagic longline fleet contributed 13%–21% of the hooks deployed during 1994–2000

and accounted for 10% of the total catch of Pacific pelagic species. In 2001 the number of active pelagic longline vessels in the western and central Pacific Ocean included 104 from China; 1,386 from Japan (combined coastal, distant-water and offshore fleets); 176 from Korea; 1,797 from Taiwan (distant-water and offshore); and 90 from Hawaii. Most of the catch and effort in terms of number of hooks set by pelagic longline vessels in the western and central Pacific region is by the large-vessel, distant-water fleets of Japan, Korea and Taiwan. Distant-water vessels from China have recently entered the fishery, and a longline fishery in Vietnam has been developing rapidly. The Hawaii pelagic longline fleet comprises roughly 3% of the total pelagic longline vessels operating in the western and central Pacific Ocean region (where fishing grounds overlap sea turtles distributions) and roughly 5% of the total effort in terms of number of hooks set per year in this area.

Research on Hawaii-based longliners by the Council, NMFS and the fishing industry has developed an array of methods for mitigating longline-seabird interactions. Recent trials with a new side-setting longline technique have shown that seabird interactions can be reduced to almost zero. The Council has recently recommended the establishment of a model swordfish longline fishery to conduct trials with sea turtle mitigation technology developed by NMFS in the Atlantic. This new method of fishing employs 18.0 circle hooks and mackerel bait, which in the Atlantic reduced loggerhead turtle interactions by 92% and with leatherback turtles by 97%. The model fishery is unique as it incorporates a range of sea turtle conservation measures at key leatherback and loggerhead nesting and foraging sites in East and Southeast Asia, and Mexico. The model fishery will also offer further opportunities to test turtle mitigation technology, and to serve as a demonstration of environmentally responsible longline fishing for foreign longline fleets that fish in the Pacific.

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Ecosystem-Based Management

In 1996, NMFS convened the Ecosystem Principles Advisory Panel to assess the extent to which ecosystem principles are used in fisheries management and research and to recommend how such principles can be further implemented to improve management of U.S. living marine resources. Based on the recommendations from the Ecosystem Principles Advisory Panel, the Western Pacific Council integrated many of the basic principles and policies of ecosystem-based fisheries management into its Fishery Management Plan for Coral Reef Ecosystems. The Council recognizes that the Coral Reef Ecosystems FMP represents just the first step in developing Fishery Ecosystem Plans. The Council also acknowledges that the complexities involved in ecosystem-based management will require years of research, development and understanding of ecological systems that produce and support fishery resources.

In working toward incorporating ecosystem-based management principles into all FMPs and development of true Fishery Ecosystem Plans, the Council will convene an Ecosystem-based Management Workshop next year to explore this complex approach to fisheries management. Of immediate importance is gaining an understanding of the relationship between managing fisheries on an ecosystem and trophic interaction level rather than managing fisheries by traditional single species management approaches. An initial approach will be to consider the fishery resources managed by the Council broadly split between those confined to the island archipelagoes that comprise the Western Pacific Region and the highly migratory species that

range across the pelagic ecosystem of the Pacific Ocean. It is also of equal importance to understand the implications of ecosystem-based management in light of the National Standards required by the Magnuson-Stevens Fishery Conservation and Management Act. Recognizing that ecosystems are neither static nor predictable, the basic tenets of ecosystem-based management must be founded on an adaptive management approach.

Access by Indigenous Communities

The Western Pacific Council continues to focus on providing adequate access to marine resources by indigenous communities in the U.S. Pacific islands. The Council's Indigenous Program seeks to establish the legal, scientific and historical bases to justify preference rights for Carolinians, Chamorros, Native Hawaiians and Samoans in the Council's geographic area of authority. The Council will continue to develop and strengthen support for preference rights of the indigenous people of the U.S. Pacific islands to provide opportunity and access for the native people in fisheries. In addition, there is growing interest in investigating contemporary applications of traditional conservation methods used by indigenous Pacific islanders. The Council sees an opportunity to accommodate this growing interest through the Council process and is working with Congress to recognize indigenous fishing rights and increase the benefits that indigenous peoples derive from fisheries.

Stock Assessments

The Western Pacific Council has placed a major focus on conducting stock assessments to implement the new biomass-based overfishing control rules. The Council will hold a Bottomfish Stock Assessment Workshop in January 2004 and a Coral Reef Fish Stock Assessment Workshop in February 2004 to initiate this new priority. A stock assessment for striped marlin is expected by early 2004, and region-wide stock assessments of mahimahi, wahoo, opah and pomfret species are priorities for the future.

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WPFMC celebrates 25 years of conservation and management, October 2001.

Conclusions

The fisheries in the Western Pacific Region are unique compared to other U.S. fisheries. The physical differences are striking, as the Region comprises a scattering of small islands across the tropical Pacific with an immense collective EEZ, little coastal shelf and an economic reliance on fisheries for highly migratory pelagic species. Fish and fishing have unique sociocultural significance for the indigenous peoples of the Western Pacific Region, and it was primarily with this in mind that the interests of island indigenous peoples were embodied in the Magnuson-Stevens Fishery Conservation and Management Act. NMFS also recognized the unique characteristics of the U.S. Flag Pacific Islands, and in 2003, the Pacific Islands Region was established, with a new regional office and science center in Honolulu.

The challenge for the Western Pacific Council is to manage fisheries within its jurisdiction for the benefit of the people of the area and to participate at the international level in the management of highly migratory stocks. This will require mainstreaming best practices for minimizing bycatch of species such as sea turtles and seabirds and incorporating principles of ecosystem-based management into all existing FMPs. Equally essential is the Council's continued work to provide indigenous communities access to marine resources so that this rich cultural tradition may persist for future generations.

8. North Pacific
Fishery Management Council

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The North Pacific Fishery Management Council is one of eight regional councils established by the Magnuson-Stevens Fishery Conservation and Management Act in 1976 to manage fisheries in the 200-mile Exclusive Economic Zone. The Council primarily manages groundfish fisheries in the Gulf of Alaska, Bering Sea, and Aleutian Islands. The groundfish species (primarily Pacific cod, pollock, flatfish, Atka mackerel, sablefish, and rockfish) are harvested by trawl, longline, jig, and pot gear. The Council also makes allocation decisions for the halibut fishery, in concert with the International Pacific Halibut Commission, which manages biological aspects of the resource for U.S.-Canada waters. Other large Alaska fisheries that target salmon, crab, scallops and herring, are managed jointly with the State of Alaska.

The Council has eleven voting members representing state and federal fisheries agencies, industry, fishing communities, and academia. Six are from Alaska, three are from Washington, one from Oregon, and one representative from NOAA Fisheries. The Council's four non-voting members represent the U.S. Coast Guard, U.S. Fish and Wildlife Service, Department of State, and the Pacific States Marine Fisheries Commission. The Council's offices and staff are located in Anchorage, Alaska. The Council receives advice at each meeting from a twenty-two member Advisory Panel (representing user groups, environmentalists, recreational fishermen, and consumer groups), and from a twelve-member Scientific and Statistical Committee of highly respected scientists who review all information brought to the Council.

Each Council decision is made by recorded vote in a public forum after public comment. Final decisions then go to the Secretary of Commerce for a second review, public

(Photos above, left to right)
Lingcod and coral at the Sitka Pinnacle Marine Reserve.
NOAA Fisheries

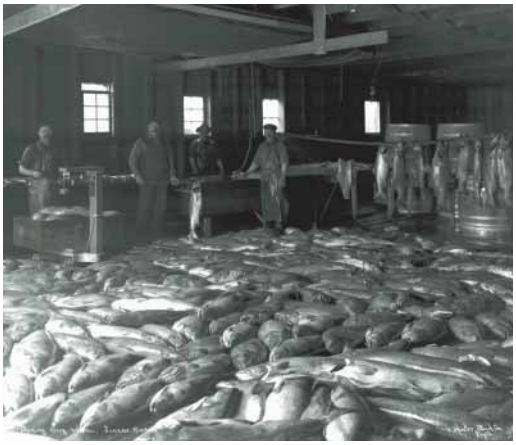
Salmon troller, Southeast Alaska.
Art Sutch

Dutch Harbor, Alaska.
NOAA observer weighs a sample.
Steller sea lions at a haulout.
NOAA Fisheries

comment, and final approval. Decisions must conform with the MSA, the National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, Regulatory Flexibility Act, and other applicable law including several executive orders. Regulatory changes may take up to a year or longer to implement, particularly if complex or contentious.

The Council prepares and modifies fishery management plans (FMPs) for fisheries under its jurisdiction. Each FMP contains a suite of management tools that together characterize the fishery management regime. These management tools are either framework measures (which allow for annual or periodic adjustment using a streamlined rulemaking process), or are conventional measures that are fixed in the FMP (or its implementing regulations) and require a formal plan or regulatory amendment to change. Amendments to the FMPs (and associated fishery regulations) are considered at each Council meeting, with proposed amendments submitted by both the resource agencies and the public. As a result, the FMPs and fishery regulations are dynamic and are continuously changing as new information or problems arise.

The North Pacific Council has prepared and implemented FMPs for the groundfish, crab, salmon, and scallop fisheries off Alaska. The Bering Sea/Aleutian Islands (BSAI) Groundfish FMP includes all species of groundfish (pollock, cod, flatfish, sablefish, rockfish, etc.) and management measures for vessels using trawl, longline, pot, and jig gear. The Gulf of Alaska (GOA) Groundfish FMP includes the major groundfish target species in the area (except for a few that are managed by the State of Alaska), and many management measures mirror the BSAI groundfish FMP. The BSAI King and Tanner Crab FMP includes all species and fisheries for king crab (red, blue, and brown), Tanner crab, and snow crab. The Alaska Scallop FMP was developed to control fishing effort in the weathervane scallop fishery. Only seven vessels are permitted to fish in the statewide fishery under a license limitation program. In-season management of all crab and scallop



Alaska State Library, Historical Collections, PCA 87/1799

Packing king salmon in Juneau, 1800s.

fisheries is under the authority of the State of Alaska. The Alaska Salmon FMP was developed to prohibit fishing for salmon in federal waters except by a limited number of vessels using troll gear in Southeast Alaska. All other salmon fisheries are conducted in State waters and are managed by the State of Alaska.

A Look at the Past — Development of Alaska's Fisheries Management Program

Fish have been commercially harvested off Alaska since 1864, when the first schooner and its compliment of dory fishermen sailed north to Bristol Bay to catch cod with handlines and setlines. Only ten years after the U.S. purchase of Alaska from Russia in 1867, the salmon fishery became established with the opening of a cannery in Klawock. The salmon fishery quickly expanded in subsequent years with additional canneries built along the Alaska coast. Other domestic fisheries in these early years targeted Pacific cod, sablefish, and halibut using handlines and setlines. By the early 1930s, the Japanese had initiated trawl fisheries for crab, flounders, and pollock in the Bering Sea, but further development of the fishery was suspended with the beginning of World War II.

Major commercial fisheries for groundfish and crab developed in the late 1950s with the resumption of fishing by the Japanese and a developing Soviet distant water fleet. The trawl fleets first focused on yellowfin sole in the Bering Sea, with very large catches (totaling

1.62 million mt) made in the 1959-1962 period *(Figure 1)*. Pacific ocean perch and other rockfish were intensively harvested in the Aleutian Islands area *(Figure 2)* and Gulf of Alaska *(Figure 3)* from 1963-1968 (totaling 1.56 million mt). Over 240 Japanese and Soviet trawl vessels and motherships were operating in these fisheries by 1963. In addition to the trawl fleet, approximately 60 Japanese longline vessels targeted sablefish, rockfish, Greenland turbot, and halibut during the early 1960s. By the end of the 1960s, the foreign trawl fleets shifted their focus to catching and processing pollock as catches of Pacific ocean perch and yellowfin sole decreased.

The foreign fisheries were virtually unregulated through 1965, and thereafter only minimally regulated until the mid-1970s. During this time period, separate agreements were made between the U.S. and foreign nations with fleets fishing off Alaska (Japan, U.S.S.R, South Korea, Taiwan). The bilateral agreements established closure areas intended to minimize gear conflicts and address allocation issues between the different foreign fleets, as well as to protect growing domestic fisheries for crab, shrimp, and halibut. By the early 1970s, about 1,700 vessels were fishing the high seas off Alaska. For the first time in 1973, bilateral agreements included catch limits for some species, namely pollock and flatfish in the Bering Sea and Pacific Ocean perch and sablefish in the Gulf of Alaska. Thereafter, catch limits were included in all bilateral agreements in effect through the implementation of the Magnuson Fishery Conservation and Management Act (renamed the Magnuson-Stevens Act in 1996).

Passage of the Magnuson-Stevens Act in 1976 marked a new era in fisheries management. This Act established the 200 nm Fishery Conservation Zone (later called the Exclusive Economic Zone), and set up the regional council system to allow fishery management decisions to be made at the more local level. The North Pacific Fishery Management Council, which was (and remains) responsible for developing management plans for fisheries off Alaska, quickly convened and prepared preliminary fishery management plans. These

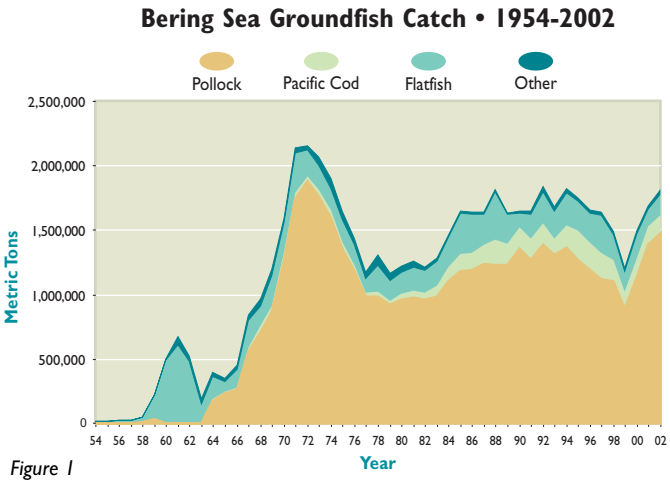


Figure 1

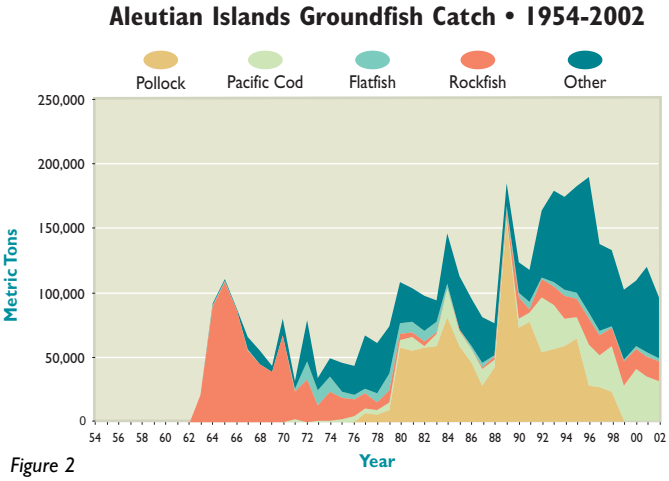


Figure 2

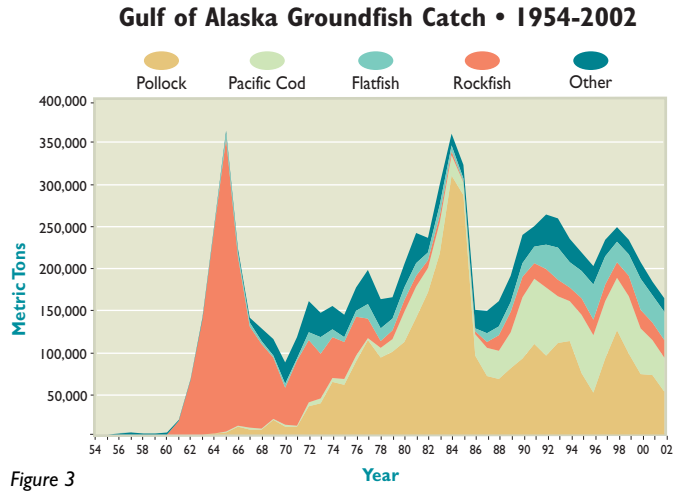


Figure 3

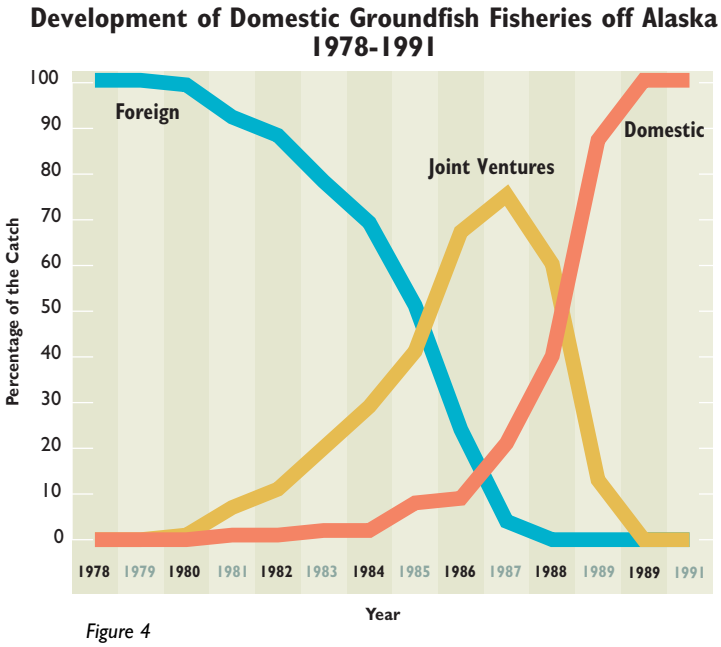


Figure 4

preliminary plans allowed foreign fishing within 200 nm, but under much more restrictive measures designed to arrest the suspected decline of some stocks. During this same period, the North Pacific ecosystem was undergoing an atmospheric driven regime shift. Ocean circulation patterns were drastically altered after 1976, causing changes in ocean upwelling and temperature and resulting in different levels of ocean productivity and diversity. Many species (such as king crab and shrimp) faired poorly under the new conditions, while other species (groundfish such as pollock and flatfish) flourished. Besides salmon and halibut, the other major domestic fishery at that time was the Bristol Bay red king crab fishery, which collapsed in 1981 due to poor recruitment.

Fishery management plans were implemented for GOA groundfish fisheries in 1979 and BSAI groundfish fisheries in 1982 to replace the preliminary management plans, which had applied only to foreign fisheries. Both FMPs included most of the provisions of the preliminary plans, thus establishing the fundamental basis for future management of domestic fisheries. The primary objectives of the early FMPs were to conserve target groundfish species, and protect certain species utilized by domestic fisheries. The FMPs established allowable catch limits for each target species, and fisheries were closed when the limits were reached. Additionally, an overall optimum yield (OY) limit for groundfish was established, thus limiting the total annual catch of all species combined to 2.0 million mt in the BSAI and 800,000 mt in the GOA management area. Further, the FMPs prohibited retention of all salmon, crabs, shrimp, and halibut taken incidentally in groundfish fisheries (prohibited species), and established trawl area closures to limit bycatch of crab and halibut.

One of the stated goals of the Magnuson-Stevens Act was to encourage the development of domestic fisheries for groundfish off Alaska, and this goal was rapidly achieved in the 1980s *(Figure 4)*. The Act required that domestic operations be given priority in the allocation of optimum yield. As such, domestic fisheries and U.S. vessels participating in joint ventures were allocated as much of the optimum yield as they could potentially catch. Joint ventures of U.S. catcher vessels delivering to foreign motherships began in 1980, and by 1987 accounted for about 75% of the groundfish catch. Harvests by fully foreign operations had virtually ended by 1988. Throughout this time, the domestic fleet and infrastructure was expanding, and by the end of the decade the entire catch was taken by domestic operations. Americanization of the fishery had occurred more rapidly than anyone had anticipated.

Management efforts in the 1990s focused on limiting effort of the burgeoning domestic groundfish fleet. By 1991, the fleet already had excess capacity, with vessels competing for the allowable catch limits. Despite challenges to raise the OY limit in the BSAI, the Council chose not to raise the limit because of concerns regarding stock assessment uncertainty and potential ecosystem effects. By 1992, the fleet had grown to over 2,200 vessels, including about 110 trawl catcher processors (factory trawlers). The symptoms of overcapacity intensified; the "race for fish" resulted in shorter fishing seasons and bitter allocation disputes. One of the most contentious issues during the early 1990s was the allocation of pollock among trawl catcher vessels delivering shoreside and the trawl catcher processor fleet. By the mid-1990s, the primary allocation disputes among gear types were also settled for Pacific cod in the BSAI management area.

Arctic Storm

To more directly address the overcapacity problem, the Council, working together with the NOAA Fisheries Alaska Regional office, aggressively pursued capacity limitations in all managed fisheries. An Individual Fishing Quota program for halibut and sablefish fisheries was adopted in 1992. A moratorium on new vessel entry for groundfish and crab fisheries was implemented in 1996, with a more restrictive license limitation program in place by 2000. In 1998, the American Fisheries Act was passed by Congress and implemented by the Council and NOAA Fisheries the following year. The Act limited access to the Bering Sea pollock fisheries only to qualifying vessels and processors, eliminated a number of large catcher processor vessels from the fleet, and established a system of fishery cooperatives that allows for individual catch and bycatch accountability. In 1999, the Council adopted a very restrictive limited entry program for the scallop fishery. With only seven vessels permitted in the statewide fishery, participants now operate in a rational manner by working together as a cooperative.

Measures implemented in the 1990s also were designed to limit impacts on target and bycatch species, marine mammals and seabirds, and habitat, and provide opportunities for disadvantaged coastal communities along the Bering Sea. A comprehensive domestic groundfish observer program, funded by participating vessels, was instituted in 1990 to provide the basis for controlling catch within allowable levels and monitoring bycatch levels. Closure areas and bycatch limits were established for chinook and chum salmon taken in Bering Sea trawl fisheries. Additional year-round trawl closure areas were established to reduce bycatch and protect habitat for Bering Sea crab stocks. In 1990, Steller sea lions were listed as threatened under the Endangered Species Act, and numerous measures were implemented over the following decade to minimize

Sally Bibb, NOAA Fisheries

potential interactions with fisheries and potential competition for prey. These measures included incidental take limits, 3 nm no entry buffer zones, 10 nm no trawl zones around rookeries, 20 nm no pollock fishing zones, seasonal and spatial dispersal of pollock and mackerel fisheries, and a prohibition on the harvest of forage fish.

The Present — Current Fisheries and Management Measures

Fisheries are one of the most important industries in Alaska, culturally and economically, providing nearly half of all private sector jobs, and second only to the oil industry in providing revenue to the state. Over 10,000 people are involved in groundfish fishing and processing alone; thousands more work in the salmon, crab, scallop, and other fisheries. In addition, thousands of people work in other fisheries and fishing support industries, such as sport fishing guides, gear and fuel suppliers, restaurants, hotels, airlines, and others. With over 47,000 miles of coastline, and 336,000 square miles of fishable continental shelf area, the waters off Alaska support a variety of fisheries. The groundfish fisheries are prosecuted by a fleet of approximately 240 trawl vessels, 1,000 longline vessels, 220 vessels using pot gear, and 50 vessels using jig gear. Many of these vessels also participate in the Bering Sea crab fisheries where there are about 300 licensed vessels overall. Fishing vessels targeting groundfish range from small skiffs fishing for near-shore halibut, to a 600 foot mothership and nearly 400 foot catcher/processors prosecuting midwater pollock fisheries in the open waters of the Bering Sea. In between are mid-size vessels, anywhere from 50 to 150 feet in length, engaged in long-line fisheries for halibut, sablefish, and

NOAA Fisheries

cod, trawl fisheries for cod, pollock, and flatfish species, as well as pot fisheries for cod and crab. Recreational fisheries are an important part of the fisheries off Alaska, though the Pacific halibut fisheries are the only sport fisheries where Council management is directly involved. Salmon are caught in both commercial and recreational fisheries, which are managed by the Alaska Department of Fish and Game, with the exception of bycatch measures in the groundfish fisheries implemented through the Council process.

These fisheries are an important source of food for the U.S. and the rest of the world. About one-half of the total U.S. fish catch each year comes from waters off Alaska. In 2002 for example, the fish catch off Alaska included about two million metric tons of groundfish (nearly 4.5 billion pounds), valued at over half a billion dollars (ex-vessel value prior to processing). Over 93% of this catch was retained for processing. With a 30% utilization rate (portion of the fish used for human food), and an average meal portion of 5 oz., this catch translates into nearly four billion meals. Numerous coastal communities throughout Alaska were built around commercial fisheries, and remain heavily dependent on the sustained viability of the salmon fishery as well as the groundfish, crab, and halibut fisheries managed through the Council process. These fisheries also remain important to communities and individuals outside of Alaska, particularly in the states of Washington and Oregon, where many of the pioneers of these fisheries originated.

Assessing our present state of progress in fisheries management requires us to recognize that fisheries management is a fluid process. Specific management plans, and amendments to those plans, represent critical benchmarks in that process, but many of the most successful management plans involve iterative, progressive steps, and cannot be fully captured with a single snapshot in time. In describing the present state of fisheries management in the North Pacific, we will describe a number of actions, some very recent, and others with a genesis in the mid- to late-1990s. The Sustainable Fisheries Act of 1996, enacted with reauthorization of the Magnuson-Stevens Act, set the stage for many of the management actions currently in place in all regions of the country. Several provisions in that Act were specific to the North Pacific region. That Act underscored many of the management measures already in place in the North Pacific, or which were under development at the time of the Act's passage.

Public Participation and Agency Partnership

One of the keys to successful fishery management is incorporating diverse views into decision making through a transparent public process. The Council system was designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders. Council meetings are open, and public testimony — both written and oral — is taken on each and every issue prior to deliberations and final decisions. Public comments are also taken at all Advisory Panel and Scientific and Statistical Committee meetings. The Council also appoints a number of working committees with representation from industry sectors, environmental organizations, and other constituents to provide recommendations on specific issues. This committee process is critical to the Council's development of fishery management measures, and provides an additional level of stakeholder input to all decisions.

The North Pacific Council works closely with its partner agency, NOAA Fisheries. As noted previously, all Council decisions are forwarded as recommendations to the Secretary of Commerce, for review and approval. NOAA Fisheries effects this review and approval process, and is integrally involved in the development of all management measures, through both its membership on the Council, and providing the science, data,

and analyses to support fishery management plan and regulatory amendments. In the North Pacific this cooperative structure is one of the greatest strengths of the management process. Most management initiatives, including the preparation of required MSA and NEPA analyses and implementing regulations, are jointly developed by staff from the Council and NOAA Fisheries. Enforcement and legal aspects relative to any proposed management action are addressed through the involvement of NOAA Fisheries Office of Enforcement and NOAA Office of General Counsel, respectively. The direct involvement of NOAA Fisheries in the development of management measures, and its willingness to work directly with the Council in creating innovative management approaches, is a key ingredient to the success of the management process in the North Pacific.

In addition to its partnership with NOAA Fisheries, the Council enjoys excellent cooperation and assistance from other agencies. Below is a summary of the other agencies involved in management of North Pacific fisheries.

Alaska Department of Fish and Game conducts research and management of groundfish, crab, scallop, herring and salmon fisheries in cooperation with NOAA Fisheries and the Council.

Alaska Board of Fisheries sets management policies and regulations for State of Alaska managed fisheries, and works closely with the Council on issues of mutual concern or where cooperative management is needed.

International Pacific Halibut Commission establishes the annual catch limits for halibut, conducts biological research on halibut, and provides biological information to the Council for allocative decisions such as IFQs, bycatch, subsistence and guided sportfish fisheries.

Pacific States Marine Fisheries Commission coordinates fishery research, data, and management among different agencies within the Pacific region.

U.S. Fish and Wildlife Service conducts research and management activities for seabirds, freshwater fish, sea otters, walrus, polar bears, and other animals. They provide advice on how to minimize the effects of fisheries on these and other ecosystem components.

U.S. Coast Guard

U.S. Coast Guard is responsible for enforcement of laws and regulations pertaining to fisheries, pollution, and safety. They provide the Council with advice on fisheries enforcement and safety.

Sound Science and a Conservative Philosophy

A recent report from the National Academy of Sciences, "Science and its Role in the National Marine Fisheries Service" determined that the science underlying our fisheries management system is among the best in the world, particularly with regard to stock assessment models, and that NOAA Fisheries should maintain and advance its tradition of excellence in fisheries science. In the North Pacific, that science appears to be among the best of the best, with sophisticated stock assessment models employed for every major groundfish species, and extensive stock assessment surveys conducted in the Bering Sea and the Gulf of Alaska. Additional stock assessment information is provided by the International Pacific Halibut Commission, for Pacific halibut, and by the Alaska Department of Fish and Game, for some rockfish species and for non-groundfish species such as crab, scallops, herring, and salmon.

The responsible use of that science by fisheries managers provides the foundation for sustainable fisheries. Strict annual catch limits for every groundfish fishery are a basic tenant of the sustainable fisheries management approach in the North Pacific. A rigorous process in place for 26 years ensures that annual quotas are set at conservative, sustainable levels. Beginning with scientific data from regular groundfish abundance surveys, stock assessment scientists recommend acceptable biological catch (ABC) levels for each species. These are reviewed by the Council's Groundfish Plan Teams,

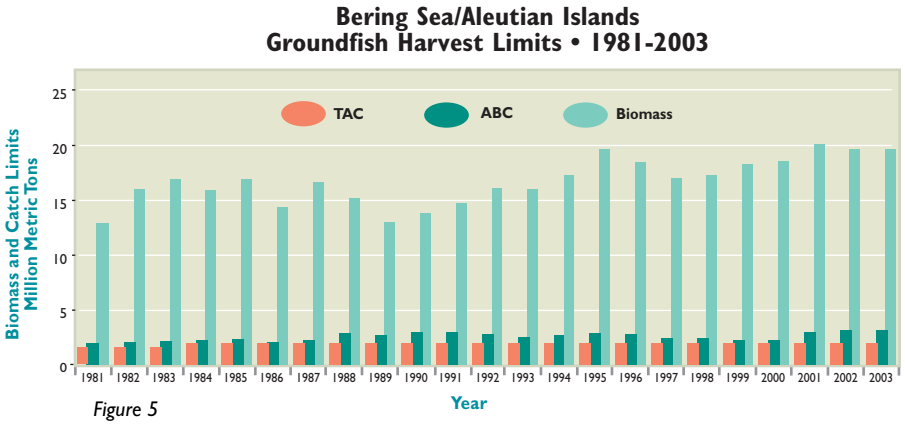


Figure 5

NOAA Fisheries

then further reviewed by the Council's Scientific and Statistical Committee, prior to the Council's setting of the Total Allowable Catch (TAC), which is always set at or below the ABC, and far below the designated overfishing level. In 2002, the Council took a further step when it commissioned an independent review of basic exploitation strategies by a panel of internationally recognized stock assessment scientists. That report was completed early in 2003, and results are being incorporated in the annual specifications process this year. Specific recommendations for a more conservative approach to exploitation of certain rockfish species, as well as implications for management of several non-target species will be considered by the Council and NOAA fisheries scientists in the near future.

As an additional precautionary measure, the Bering Sea and Aleutian Islands quotas, for all groundfish combined, are capped at a maximum of two million metric tons (mt) annually, regardless of the maximum recommended ABC levels *(Figure 5)*. For example, ABCs for 2003 totaled nearly 3.5 million mt, yet TACs were reduced to stay within the 2 million mt cap. Due to the complex array of regulations governing these fisheries (including seasonal and area allocations, allocations by gear type, closed areas, gear restrictions, and bycatch caps for certain species), actual harvests average about 90% of TAC and 65% of ABC. Catch of all species, whether targeted or taken as bycatch, whether retained or discarded, count toward the annual catch limits, and fisheries are closed when these limits are reached. For the past 28 years, groundfish harvests have been sustained in the 3 to 5 billion pound range, and no groundfish stocks are considered overfished. With an estimated 25 billion pounds of pollock swimming in waters off Alaska, the fisheries take less than 15% of the biomass each year. Two crab stocks are currently considered overfished (though climatic factors are the likely reason, rather than fishing) and these stocks are currently subject to aggressive rebuilding plans, including zero or limited fishing allowance.

Effective Monitoring and Enforcement

Strict catch quotas, as well as the wide array of additional management measures, are only as effective as our ability to monitor and enforce those measures. One frequent criticism of fisheries management is that total catch and bycatch may not be fully and accurately accounted. A combination of reporting requirements, observer coverage, and real-time, in-season monitoring ensures that annual catch and bycatch quotas in the North Pacific are not exceeded. All processors and catcher/processors are required to maintain detailed logbooks of catch, discards, landings, and production. Data are reported for target species, non-target species, and prohibited species. Daily reporting is required from some processors, and weekly reporting from the rest. Electronic reporting systems, developed by NOAA Fisheries, are utilized by many processors and vessels. These systems improve the timeliness and accuracy of data available for fishery management. Over 98% of the groundfish delivered to the shoreside processing sector is reported using the daily electronic reporting system. Catcher vessels delivering their harvest to shore plants or floating processors in State waters are required to record all harvest on State fish tickets after each trip. Catcher vessels over 60 feet in length are required to maintain fishing logbooks, and an electronic fishing

logbook for trawl vessels is being used by an increasing number of vessels. Coupled with observer reports, this system allows fisheries managers at NOAA Fisheries to: closely monitor overall catch levels, as well as seasonal and area apportionments; close designated areas, or fisheries, if bycatch limits for prohibited species (halibut, crab, salmon, herring) are attained; close specific areas for habitat or protected species conservation; monitor the take of any ESA listed mammals or seabirds; and, provide a database for predicting consequences of future management actions.

At the core of the monitoring system is a comprehensive, industry-funded, on-board observer program, coupled with requirements for total weight measurement of most fish harvested. Except for small vessels less than 60 feet, all vessels fishing for groundfish in federal waters are required to carry observers, at their own expense, for at least a portion of their fishing time. The largest vessels, those over 125 feet, are generally required to carry observers 100% of the time, with multiple observers required on catcher/processors and in certain fisheries. Scales to weigh catch are also required on many of the larger vessels. Most shoreside processing plants are also required to have observers at all times, and to weigh all fish landed at each processing location. Observers estimate total catch weight, catch composition, and discards, and collect biological information critical to stock assessment. In excess of 36,000 observer days, by over 500 observers, are logged in these fisheries each year. In the North Pacific's largest fishery, for walleye pollock, nearly 85% of the total catch is measured and sampled by observers, with 99% of the catcher/processor (factory trawler) harvest sampled by observers. Used in conjunction with reporting and weighing requirements, the information collected by observers provides the foundation for in-season management and for tracking species-specific catch and bycatch amounts. The Council and NOAA Fisheries are currently developing amendments to the fishery management plans that are designed to better ensure ongoing collection and quality observer data. These amendments will examine alternative funding mechanisms (for example, a fee-based program instead of direct payment by vessels required to carry observers), and alternative service delivery models, all designed to allow fisheries managers to more effectively determine specific observer deployments by fishery and by vessel. Technological innovations, such as digital (video) observer applications, are also being evaluated by the Council and NOAA to potentially supplement onboard observers.

Enforcement of fishery regulations is accomplished by complementary efforts of NOAA and State enforcement agencies, and the U.S. Coast Guard, both on the grounds and dockside. As part of their patrol activities, the Coast Guard enforces a complex array of domestic regulations and international treaties, including enforcement of the maritime boundary and high seas driftnet violations. The Coast Guard also maintains its priority mission of search and rescue, a critical mission in all U.S. waters, particular in the volatile Bering Sea. NOAA Enforcement also conducts patrols and investigations throughout coastal Alaska to enforce fisheries regulations and total catch limits. Recently, vessel monitoring system (VMS) requirements have been imposed on many of the fisheries off Alaska, to enforce complex time and area closures resulting from management measures to further protect Steller sea lions. The Council also maintains an Enforcement Committee, consisting of representatives from each enforcement agency as well as fisheries managers and legal counsel. This Committee meets on a regular basis to address enforcement aspects of all proposed management actions.

Ecosystem Considerations

While the overall precautionary approach employed in the North Pacific appears to work very well for sustainable management of individual species, the single-species approach may not fully accommodate broader concerns for ecosystem health. This is one of the biggest challenges facing fisheries managers, and it will be critical to develop a national strategy that incorporates a realistic approach, and which allows for regional focus, recognizing the relevant information available, and that which is not currently available. For several years managers in the North Pacific have embraced

many of the basic tenants of ecosystem management (Witherell et al. 2000). Ideally, fishery management decisions would be made with a full understanding of the impacts of fish harvesting on all components of the marine ecosystem. Because additional research is necessary to understand all potential impacts, the Council works to minimize unforeseen impacts by incorporating a precautionary approach to all fishery management decisions, and with an eye towards long-term sustainability of marine resources.

Over the past several years, this precautionary approach has developed into a more comprehensive ecosystem-based approach. The Council's approach closely mirrors the recommendations of the National Research Council for sustaining marine fisheries (National Research Council 1999a), with the goal 'to rebuild and sustain populations, species, biological communities, and marine ecosystems at high levels of productivity and biological diversity, so as not to jeopardize a wide range of goods and services from marine ecosystems, while providing food, revenue, and recreation for humans' *(Table 1)*. While we have yet to develop explicit fishery ecosystem plans because of the paucity of data and lack of scientific based ecosystem models, our strategy is to minimize potential ecosystem effects while allowing for sustainable fish removals as we gain the knowledge necessary to implement more specific measures.

National Research Council's Recommendation	In Existing Program?
Adopt conservative harvest levels for single species fisheries	Yes ✓
Incorporate ecosystem considerations into management decisions	Yes ✓
Adopt a precautionary approach to deal with uncertainty	Yes ✓
Reduce excess fishing capacity and assign fishing rights	Yes ✓
Establish marine protected areas as a buffer for uncertainty	Yes ✓
Include bycatch mortality in TAC accounting	Yes ✓
Develop institutions to achieve goals	Yes ✓
Conduct more research on marine ecosystems	Yes ✓

Table 1

Habitat Protection

Ocean habitat is essential for maintaining productivity of fishery resources, and is a key component of an ecosystem-oriented management approach. Habitat that provides structural relief on an otherwise featureless bottom can be particularly important to fish for food, reproduction, and shelter from predators. Structural habitat includes boulders, corals, anemones, kelp, and other living organisms attached to the ocean bottom.

Because structural habitat has the potential for being disturbed by fishing gear, regulations have been implemented to protect areas where this habitat type is known to occur. Vast areas of the North Pacific have been permanently closed to groundfish trawling and scallop dredging to reduce potential adverse impacts on sensitive habitat and to protect juvenile crab. A vulnerable nearshore pinnacle off Cape Edgecumbe in southeast Alaska has been closed to fishing with all gear types. The entire southeast Gulf of Alaska is closed to trawling to protect habitat and minimize gear conflicts in that area.

These marine protected areas comprise a relatively large portion of the continental shelf, and in many respects, serve as marine reserves *(Figure 6)*. In the Bering Sea, the year-round bottom trawl closures encompass about 30,000 square nautical miles. This is an area larger than Indiana or Maine and more than twice the size of Georges Bank off the East Coast of the United States. The Gulf of Alaska trawl closures encompass an additional 60,000 square nautical miles. In addition, fishery closures established in nearshore areas throughout the North Pacific region to reduce interactions with

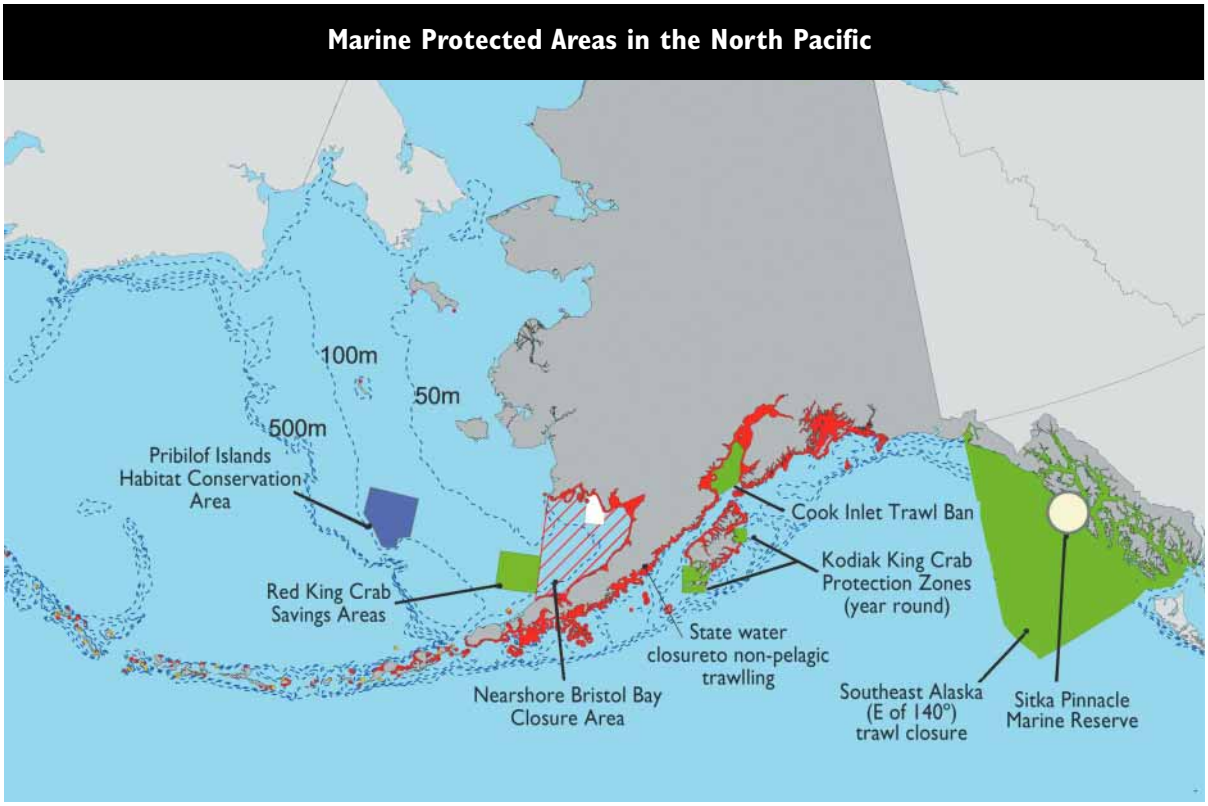


Figure 6

Steller sea lions have ancillary benefits of reducing habitat impacts, particularly in the Aleutian Islands area where concentrations of deep water corals occur (Witherell and Coon 2000). These closures to trawling, and in some cases to all fishing, total an additional 58,000 square nautical miles. In total, nearly 150,000 square miles are closed year round to trawling, or over 40% of the fishable continental shelf under the Council's jurisdiction.

All fishery management plans include a description and identification of essential fish habitat (EFH), a description of adverse impacts, and actions to conserve and enhance habitat. Maps of essential fish habitat areas are useful for understanding potential effects of proposed development and other activities. The Council currently is in the process of amending the fishery management plans to more specifically identify essential fish habitat, and identify possible, additional measures to protect that habitat. In October 2003, the Council identified its draft preferred alternative for public review through an Environmental Impact Statement (EIS) to be released in January 2004 (NMFS 2004) This 2,500 page EIS analyzes alternative definitions for EFH and habitat areas of particular concern (HAPC), and analyzes several alternatives for mitigating potential fisheries impacts. The Council's draft preferred alternative for public review and comment does not specify additional protection measures at this time, but the preferred alternative includes a specific process to further identify HAPC, which would allow for a more focused application of protection measures to the most sensitive habitat areas.

Protected Species Considerations

Marine mammals, seabirds, and other species can be impacted by fisheries through competition for prey, direct mortality, and disturbance. For most marine mammal species in the North Pacific (such as seals, whales, and otters), interactions with fisheries are thought to be minimal or nonexistent. However, concerns about the effects of fisheries have been raised regarding other protected species, in particular Steller sea lions.

NOAA Photo Library, Dr. Igor Smolyar, NESDIS/NODC

Steller sea lion populations have been declining in the western portion of their range since the late 1970s. There does not appear to be a single cause for this decline, and a number of factors may be involved including but not limited to intentional shooting in past years, disease, and food limitation. Sea lions are not only important to the ecosystem as top level predators, but also are an important food source for native peoples of the Pribilof Islands and Aleutian Islands. Steller sea lions were declared threatened under the Endangered Species Act in 1990 and the western sea lion stock was listed as endangered in 1997. Interactions of sea lions with fisheries may potentially occur through competition, disturbance, and direct and incidental mortality. Because fish are prey for Steller sea lions, fishery regulations have focused on reducing potential impacts of competition and localized depletion of their prey. Recent studies have shown major food items for Steller sea lions to include pollock, Pacific cod, Atka mackerel, salmon, and octopus. Octopus, squid and capelin were also observed to be an important prey in years prior to the 1978 regime shift.

To reduce potential effects of fisheries on Steller sea lions, the Council and NOAA Fisheries have implemented numerous measures between 1990 and 2002. Measures have included no shooting, limits on incidental kills, 3 nm no-entry buffer zones around rookeries, 10 nm to 20 nm no-trawl zones around rookeries, 10 nm to 20 nm no-pollock fishing zones around haulouts, seasonal dispersion fisheries (for pollock, mackerel and cod), spatial dispersion of mackerel and pollock fisheries, precautionary harvest limits on Steller sea lion prey, and a prohibition on all directed fishing for forage fish (such as capelin, sand lance, euphausids, myctophids, and a host of other forage species).

In October 2001, following a federal court order for NOAA and the Council to further justify the fisheries management program's impacts to Steller sea lions, a comprehensive and stringent suite of fishery management measures was adopted to minimize any potential competition for prey with the endangered western stock of Steller sea lions. These protection measures were implemented in January 2002 and include a sweeping array of fishery and gear-specific closed areas around Steller sea lion rookeries and haulouts, limitations of catch from critical habitat areas, and seasonal and area apportionments of the total allowable catch limits for pollock, Pacific cod, and Atka mackerel. NOAA Fisheries Office of Protected Resources has determined that fisheries prosecuted under these measures will not jeopardize Steller sea lions or adversely modify their habitat, and the federal court judge has closed the case. *Figure 7* illustrates the comprehensive scope of these fishing restrictions.

The Council and NOAA Fisheries utilized a unique and innovative stakeholder process to design the suite of protection measures. A Committee process, including fishermen, managers, scientists, and environmental representatives, worked over a several month period, in conjunction with analysts preparing the EIS associated with these management measures, to provide the recommended suite of measures to the Council. The EIS analysis concluded that the suite of measures was sufficient to avoid jeopardy or adverse modification of critical habitat, and was approved by the Council and NOAA Fisheries. The overall process for development of these management measures was so successful that it won a national award for excellence in NEPA process in 2003, from the National Association of Environmental Professionals.

Notwithstanding the success of that process, the measures implemented in 2002 came at great expense to

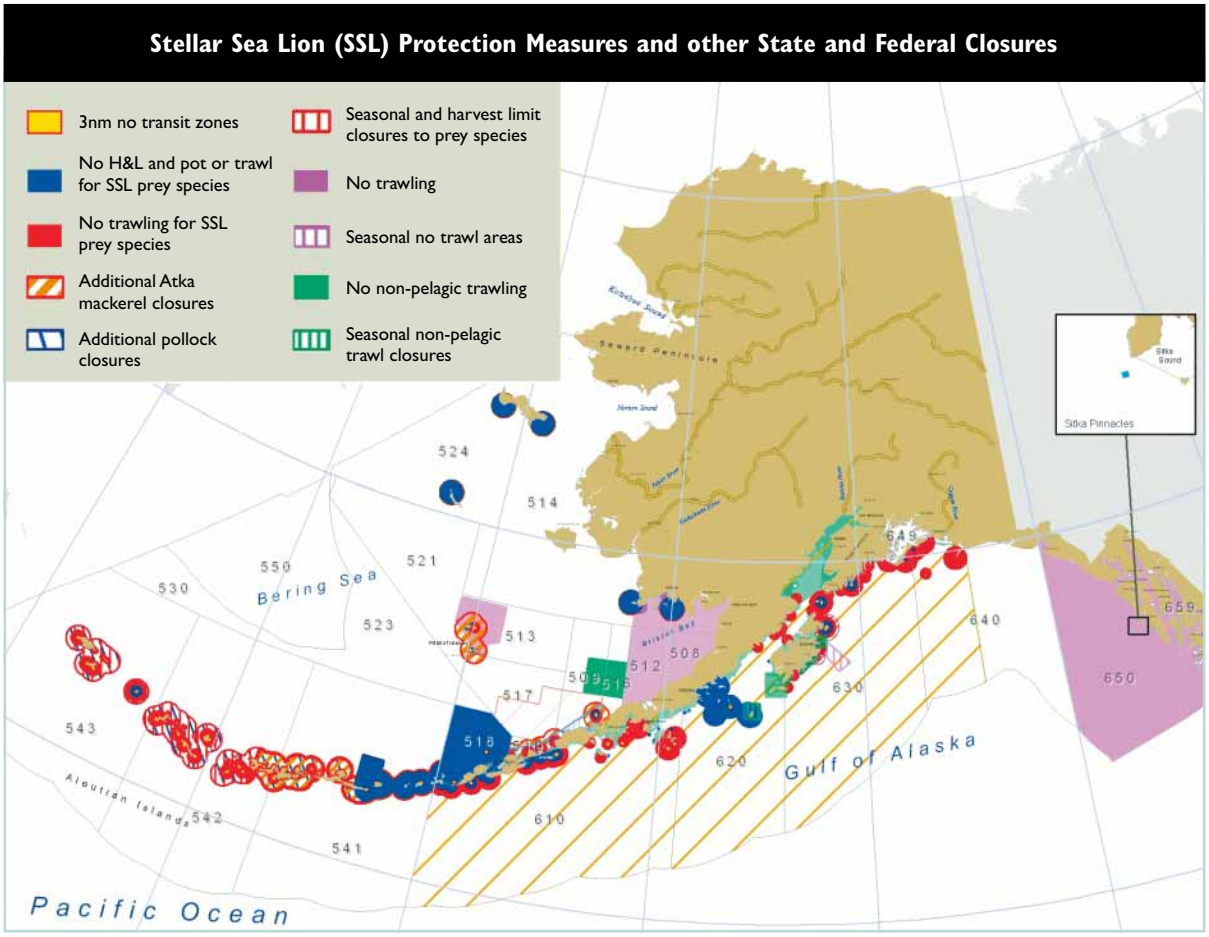


Figure 7

the fisheries operating in the North Pacific, particularly to small vessels fishing out of remote Alaskan coastal communities, where some of the most productive, accessible fishing grounds were closed. The Council's Steller sea lion mitigation Committee is working to develop adjustments to some of the closure areas in the Gulf of Alaska, to allow additional fishing opportunities in some areas, while further restricting fishing in other areas. Although the impact of fisheries on Steller sea lion decline and recovery are still uncertain, over $80 million in research has been applied over the past two years. Conclusions from those studies will not be available for some time, but there are other studies which have been completed since the Council's development of the 2001 protection measures including a comprehensive review conducted by the National Academy of Science (National Research Council 2003). While that study did not rule out competition with fisheries as a possible contributing factor relative to Steller sea lion recovery, it did indicate a number of other factors as equally or more plausible. A recent supports the hypothesis of a top-down, predator induced cause of decline in marine mammal populations, triggered by industrial whaling which in turn has driven killer whales to seek alternative prey (Springer et al. 2003).

Seabirds in the North Pacific have been another focus of Council and NOAA Fisheries management activities, including proactive measures by the fishing industry.

NOAA Fisheries

Alaska Fisheries Science Center, Marine Observer Program

Seabirds are frequent companions to commercial marine fishing vessels, attracted to the churning waters of a boat's wake to feed on escaping fish from trawl nets, seines, and other fishing gear, and on baited hooks of hook-and-line vessels. Some seabirds are incidentally caught during fishing operations, with most caught on baited hooks set by hook and line gear in pursuit of halibut, sablefish, and cod. In previous years, an estimated 20,000 seabirds (primarily northern fulmars and gulls) were incidentally killed in fishing operations. A total of five short-tailed albatross were reported caught in longline fisheries since 1990.

To reduce this incidental take, the Council has initiated a comprehensive seabird bycatch reduction program, which includes education, outreach, regulatory compliance, and enforcement to improve the effectiveness of seabird avoidance measures and reduce incidental take of the endangered short-tailed albatross and other seabird species. In 1996, the Council established mandatory seabird avoidance measures to reduce the incidental take of seabirds in hook-and-line fisheries. Through collaboration with Sea Grant researchers and the hook and line fishing industry, the Council approved more stringent requirements in 2001. Seabird deterrent devices are required on all groundfish vessels over 26 feet long (small vessels catch relatively few seabirds).

Specific measures include: longline vessels > 55 feet in length must use paired streamer lines; longline vessels 26-55 feet in length must use a buoy bag line or single streamer line; discard of residual bait or offal while setting gear is prohibited; and, all vessels must have onboard a Seabird Avoidance Plan. A substantial reduction in the numbers of seabirds taken is anticipated once these stricter regulations have been in place, and fishermen become familiar with the use of streamer lines and other mechanical devices. A vast majority (93%) of incidental seabird catch is taken in Bering Sea/Aleutian Islands longline fisheries, which is prosecuted almost exclusively (98%) by vessels larger than 55 feet. Because the use of paired streamer lines (required on vessels > 55') has been found to reduce seabird bycatch by 88%-100%, the total incidental take of seabirds by longliners off Alaska is anticipated to be reduced by 80% or more in coming years.

Bycatch and Discards

"Bycatch" is the term used to describe fish that are caught incidentally while fishing for other species, and "discards" are those fish that are caught but not kept. The Magnuson-Stevens Act defines bycatch as fish which are harvested, but not sold or kept for personal use, including economic and regulatory discards. Although fishermen try to catch only fish that can be sold, fishing gear is not 100% selective, and some undesirable fish and other organisms are caught incidentally in the course of fishing operations. Many people are concerned about environmental and allocative effects of catching fish that are not targeted and may be discarded. Fish are discarded for two reasons: either they are required to be thrown back due to regulations (prohibited species or groundfish retention limits), or they are unwanted because they are not economically profitable to be retained (not a preferred species or size for the markets).

Bycatch controls in the North Pacific were instituted on foreign fisheries prior to passage of the Magnuson-Stevens Act in 1976, and have become more restrictive over time (Witherell and Pautzke 1997). Limits on the bycatch of prohibited species (crab, herring, halibut, and salmon) have been established to reduce the impacts on these species traditionally harvested by other gear types. When bycatch limits are reached, fisheries responsible for the bycatch are closed for the rest of the season, or are prohibited from fishing in areas with historically high bycatch rates. Bycatch limits for 2003

Bycatch of Prohibited Species in Bering Sea and Aleutian Islands Groundfish Trawl Fisheries, 1994-2002.

	Halibut (mt)	Red king crab (#)	Bairdi crab (#)	Opilio crab (#)	Herring (mt)	Chinook salmon (#)	Other salmon (#)
1994	3,889	232,933	2,458,572	12,351,899	1,711	43,636	94,508
1995	3,753	32,615	2,188,931	5,165,555	969	23,079	21,780
1996	3,766	30,967	1,836,031	3,643,612	1,510	63,179	77,926
1997	3,574	50,711	1,917,736	5,276,208	1,261	50,218	67,536
1998	3,379	42,003	1,477,816	4,122,648	818	55,427	65,631
1999	3,481	84,709	901,619	1,544,747	895	12,924	46,295
2000	3,208	70,787	1,002,074	2,207,279	512	7,470	57,600
2001	3,245	58,552	950,331	1,293,143	270	37,734	57,339
2002	3,423	89,955	1,086,286	882,967	134	37,465	78,742
Percent change 1994-2002							
	-12.0%	-61.4%	-55.8%	-92.9%	-92.2%	-14.1%	-16.7%

Table 2

Bering Sea and Aleutian Island groundfish trawl fisheries included 3,675 mt of halibut mortality, 1,526 mt of herring, 97,000 red king crabs, 3,950,000 tanner crab, 4,350,000 snow crab, 29,000 chinook salmon, and 42,000 other salmon. These bycatch limits equate to less than 1% of the halibut, crab, herring, and chum salmon populations. Bycatch of chinook salmon is slightly larger, between 1 and 2%. The pollock industry, through the cooperatives established under the American Fisheries Act, has implemented its own system of real-time bycatch reporting and associated 'hotspot' closures to further address salmon bycatch.

In addition to bycatch limits, gear restrictions and other regulations have been implemented to reduce bycatch. Biodegradable panels are required for pot gear to minimize bycatch associated with so-called ghost fishing of lost gear. Tunnel openings for pot gear are limited in size to reduce incidental catch of halibut and crabs. Gillnets for groundfish have been prohibited to prevent ghost fishing and bycatch of non-target species. With the implementation of an individual fishing quota system for halibut and sablefish longline fisheries in 1995, bycatch and waste were reduced because the race for fish was eliminated, allowing for more selective fishing practices and significant reductions in actual gear deployment/loss. In 1999, the use of bottom trawl gear was prohibited for vessels targeting pollock in the Bering Sea, to reduce crab, halibut, and other non-target bycatch. *Table 2* illustrates the reductions in bycatch of prohibited species over time. With the exception of red king crab, bycatch has been dramatically reduced over time, particularly since 1996, when the Sustainable Fisheries Act became effective. Red king crab bycatch numbers have actually increased since 1996, reflective of a rebuilding of those stocks during the 1990s.

Discards are a component of bycatch that are of particular concern to many. While these discards count against the total catch quotas for each species in the North Pacific, reducing the amount of discards has been a priority for the Council and for the fishing industry operating in the North Pacific. For example, in 1993, over 17% of the groundfish caught off Alaska were discarded. By 2001, less than 7% of the catch was discarded. This reduction was due, in part, to implementation of full retention requirements — you catch it, you keep it — for pollock and cod. The fishing industry has also worked to reduce bycatch in a voluntary

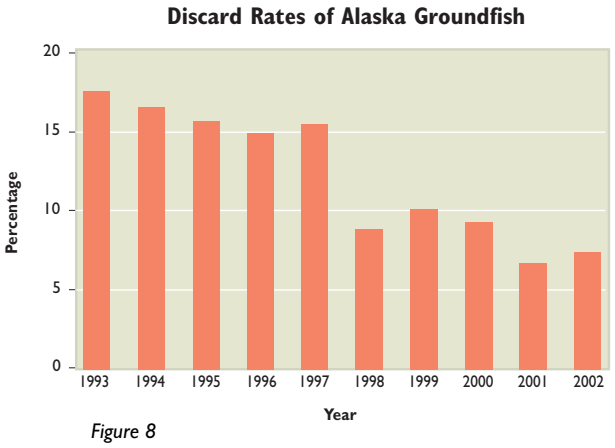


Figure 8

manner by sharing catch information and modifying gear to allow unwanted fish to escape. Implementation of an individual fishing quota system for halibut and sablefish fixed gear fisheries, and the formation of cooperatives in the Bering Sea pollock trawl fisheries, have also resulted in reduced bycatch and waste. The race for fish was eliminated, which then allowed for more selective fishing practices and development of additional markets for lower valued species, and significantly increased utilization rates (pound of product per pound of fish harvested). *Figure 8* illustrates these discard reductions, with further reductions anticipated and additional requirements currently being developed by the Council and NOAA Fisheries.

When the Council approved full retention requirements for pollock and cod in 1996, that action included a delayed implementation of similar requirements for specified flatfish species, which can have a high discard rate in the North Pacific fisheries. Full retention requirements for flatfish were scheduled for implementation in January 2003. In 2002 the Council approved a further delay of these requirements until June 2004, to provide an opportunity to develop alternative requirements which would allow the affected sectors to remain economically viable, and still reduce discards. An overall minimum groundfish retention standard was approved by the Council in June 2003, with increasing retention standards being phased in starting in 2005. Concurrently, the Council is developing a fishery cooperative for the sectors targeting flatfish species in the Bering Sea and Aleutian Islands, a program designed to provide this sector with the operational tools to adhere to the increased retention standards. These measures are expected to further reduce the overall discards of groundfish in the North Pacific fisheries. *Table 3* illustrates the effects of retention requirements for pollock and cod, and also reflect the efforts by industry to reduce bycatch and discards in flatfish fisheries, consistent with the direction from the 1996 Sustainable Fisheries Act.

Fishery Rationalization Measures

The term "rationalization" has recently become a standard phrase in fisheries management, at least in the North Pacific region. Rationalization covers many different management approaches, but primarily is used in reference to programs of limited entry or rights-based programs such as individual quotas (IQs), or, more recently, fishery cooperatives. All federally managed fisheries in the North Pacific are managed under limited entry programs (license limitation programs, which restrict the number of vessels as well as the areas fished

Discard (mt) of Groundfish Species in Bering Sea and Aleutian Islands Groundfish Trawl Fisheries, 1994-2002

	Pollock	Pacific cod	Yellowfin sole	Rock sole
1994	104,310	32,856	35,132	38,922
1995	97,138	43,164	28,022	33,108
1996	76,370	28,803	28,335	27,157
1997	91,358	22,103	32,126	39,773
1998	15,890	4,130	21,101	21,009
1999	22,827	3,708	12,493	29,761
2000	19,899	3,658	28,909	28,560
2001	16,932	2,858	8,849	10,532
2002	20,536	3,989	11,213	17,868
Percent change 1994-2002				
	-80.3%	-87.9%	-68.1%	-54.1%

Table 3

and gear types utilized), and several major fisheries are currently managed under some form of IFQ or fishery cooperative. Similar programs are under development for the remaining groundfish and crab fisheries.

Since full Americanization of the fisheries off Alaska in about 1990, the Council and NOAA Fisheries have actively and aggressively pursued capacity limitations in all managed fisheries. In 1992, the Council approved the largest IFQ program in the nation, transforming the dangerous 24 hour halibut and sablefish derby fisheries into orderly eight month fisheries prosecuted with fewer vessels, less gear on the fishing grounds, and an increased safety factor (Pautzke and Oliver 1997, National Research Council 1999b). Since implementation of this program in 1995, the number of vessels operating in this fishery has been reduced from nearly 5,000 to just over 2,000. Fresh halibut and sablefish are available to consumers nearly year-round, and unique niche marketing opportunities have been created for fishermen and processors.

A moratorium on new vessel entry into the remaining groundfish and crab fisheries became effective in 1996, with a further, more restrictive, license limitation program in place by 2000. Additional amendments were developed by the Council, and recently approved by the Secretary, to specifically reduce the number of Pacific cod license endorsements in the Bering Sea and Aleutian Islands areas. The license limitation program provides a stable platform for further rationalization programs being developed by the Council.

In 1998, the American Fisheries Act was passed by Congress, and implemented by the Council and NOAA Fisheries the following year. Under this Act, access to the Bering Sea pollock fisheries was limited to a specific number of qualifying vessels and processors, and a system of fishery cooperatives was put in place which allows the fleet to effectively assign individual vessel catch and bycatch accountability. The results of this rationalized fishery include: a 50% reduction in the number of large catcher/processors operating in these fisheries (from 21 to 14); more effective monitoring of pollock quotas, particularly numerous time and area

Mark Fina, NPMFC

closures to protect sea lions; reduced bycatch of non-target species; and, significantly higher utilization rates (pound of product per pound of raw fish caught). This program has provided an additional rationalization model for the Council and NOAA Fisheries to consider for other fisheries. Currently the Council is developing a comprehensive rationalization program for the Gulf of Alaska groundfish fisheries, with several options based on the fishery cooperative model. Similar programs for specific sectors of the Bering Sea non-pollock fisheries are also under development by the Council.

The Bering Sea crab fisheries, co-managed with the Alaska Department of Fish and Game, are particularly specialized fisheries and are widely recognized as the most dangerous fishery in the world. These fisheries have been a top priority fishery for the Council's recent rationalization efforts. Beginning with a series of industry proposals in the late 1990s, and further prompted by Congressional direction to explore rights-based alternatives for this fishery, the Council initiated formal analyses and consideration of several alternative programs. In June 2002, after two years of analysis and discussion, the Council selected a preferred alternative to rationalize the Bering Sea/Aleutian Islands crab fisheries. This preferred alternative includes a structure that would allocate both harvesting and processing quota shares to reduce capacity in both sectors, as well as provide for fishery dependent

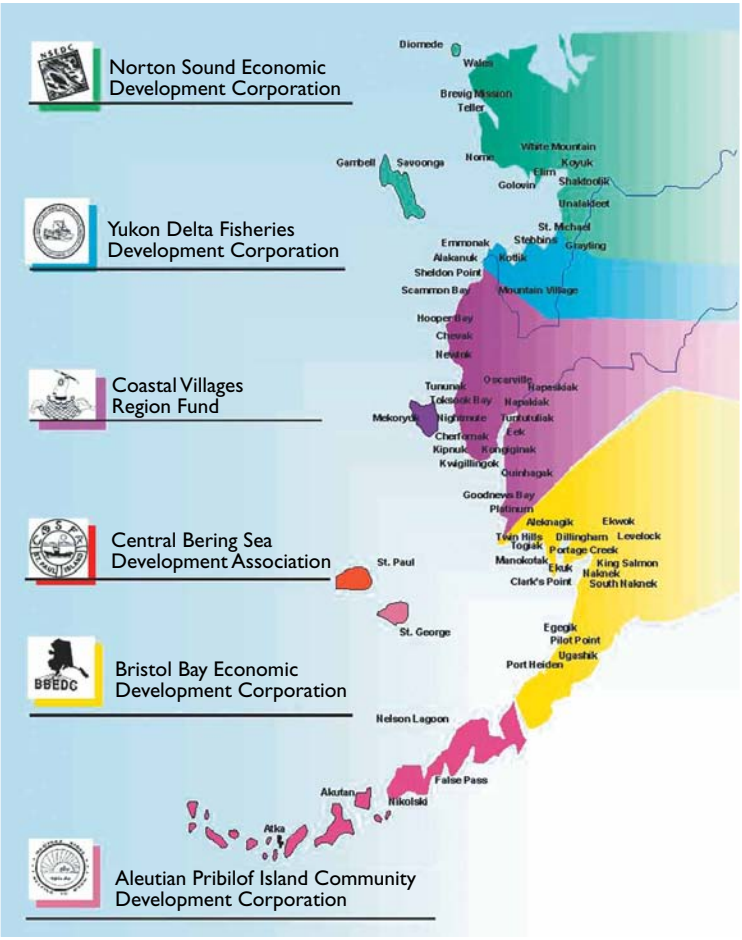


Figure 9

communities through regional and local landings provisions. Hired skippers would also be allocated a portion of the harvest shares to recognize their participation and reliance on these fisheries. An overlaying cooperative structure is expected to further enhance the efficiency and safety aspects for the future crab fisheries. The Council's program design includes mandatory data collection requirements whereby participating vessels and processors must submit detailed information annually, including cost and earnings information, to allow the Council to assess whether the program is meeting intended objectives. The Council and NOAA Fisheries are proceeding with a formal EIS process to implement this program, pending Congressional authorization required for processor quota share issuance and other program aspects. NOAA Fisheries has created an entire division in the Alaska region, the Restricted Access Management Division, to implement these limited entry rationalization programs, with a full-time staff of 16 persons.

Hazel Nelson

Fishery Dependent Communities

The North Pacific Council is proud of its long history of considering coastal community needs in its management decisions. One of its flagship programs, the western Alaska Community Development Quota (CDQ) program, began in 1992 as part of two major management initiatives (National Research Council 1999c). As part of the halibut and sablefish IFQ program, percentages of the Bering Sea and Aleutian Islands quotas were set aside for this program. In that same year as part of the inshore/offshore pollock allocations, the Council also set aside 7.5% (since increased to 10%) of the pollock quota, for exclusive use by 66 remote, coastal communities along the Bering Sea with limited, alternative economic infrastructure *(Figure 9)*. The program was expanded to include 7.5% of all groundfish and crab in 1995.

Other management programs developed by the Council have explicitly included coastal community considerations. All proposed management actions include an assessment of community and social impacts, and the Council has gone to great lengths to ensure that its policy decisions adequately protect fishery dependent communities. Extensive community profiles have been compiled for 126 coastal communities in Alaska and the Pacific Northwest, and further, more refined community profiles and community impact assessments are conducted relative to each specific management action being considered.

As part of the design of the halibut and sablefish IFQ program, numerous provisions were included to safeguard the importance of these fisheries to numerous small, coastal communities throughout Alaska and the

Pacific Northwest. These include categories of quota share based on geographic region, vessel size, and other characteristics that help maintain the owner/operator nature of the fisheries and keep the quota shares in the hands of local fishermen. The Council recently amended the program to allow coastal communities in the Gulf of Alaska to purchase and hold quota share for use by local fishermen, further enhancing the ability of these communities to remain active participants in these fisheries. In 2001, the Council developed a program to fully recognize and authorize halibut subsistence fishing activities by certain rural residents of Alaska and native tribes with customary and traditional practices of using halibut to feed their families, which have occurred for thousands of years. Regulations implementing this program became effective in 2003.

Over the past three years, the Council has crafted a balance of regulatory measures that protect near shore sea lion rookeries and haulouts (the protection measures previously described), while minimizing the burden on certain coastal communities by allowing limited fishing in areas critical to the small boat fleets based in those communities. Likewise, in its current development of rationalization programs for crab and Gulf of Alaska groundfish fisheries, the Council has included provisions which explicitly accommodate the needs and concerns identified by numerous communities who depend on seafood harvesting and processing for their continued survival. The crab rationalization program developed by the Council includes specific regional delivery requirements, designed to ensure the continued viability of communities long dependent on these fisheries. Similar provisions are being considered in the Gulf of Alaska Rationalization program, including regional delivery requirements, direct community allocations of quota, quota set-aside to be administered by community trust organizations, and options for allowing community purchase of quota shares.

Greg Cashen

Looking to the Future —Management Measures into the 21st Century

The preceding section describes the management of North Pacific fisheries since inception of the Magnuson-Steven Act in 1976. Notwithstanding this successful record, and the currently healthy fish stocks resulting from the precautionary management approach employed in the North Pacific, the Council and NOAA Fisheries recognize that remaining challenges exist. The scientific infrastructure in place, coupled with an ongoing conservative management approach, will allow us to meet these future challenges. Many of the programs described in the preceding discussion are in their initial stages of development, and represent a solid foundation for the future management focus in the North Pacific. These programs include:

- The essential fish habitat amendments to our fishery management plans, and the attendant process to identify habitat areas of particular concern;
- Further rationalization programs to reduce capacity and provide the industry with the tools to avoid and minimize incidental catch and discards;
- Implementation of minimum groundfish retention standards to further reduce incidental catch and discards;
- Continued scrutiny of exploitation strategies on fish stocks, particularly for rockfish species, including actions to implement recommendations from the Council's independent scientific review of exploitation strategies for North Pacific stocks;

- Further separation of species from fishery management plan species groups to allow for more conservative exploitation limits on individual, non-target species; and
- Improvements to the existing groundfish observer program, to allow greater flexibility for fisheries managers to place observers throughout the fisheries to maximize the quantity and utility of information collected.

One particular initiative merits additional discussion here, as it will determine the overarching policy direction for the groundfish fishery management plans over the next several years. The Council, in coordination with NOAA Fisheries, has developed a Draft Programmatic Supplemental Environmental Impact Statement (DPSEIS). The DPSEIS is one of the most important Council/NOAA initiatives guiding the future direction of the North Pacific fisheries management and assesses, at a broad, programmatic level, the authorization of the groundfish fisheries under the existing management program. This 7,000-page document includes a comprehensive analysis of the changes in the biological and economic environment since the implementation of the FMPs (circa 1980), as well as proposing alternative policies for managing the groundfish fisheries into the future (NMFS 2003). The development of the PSEIS and the resulting decision on groundfish fishery management policy has precipitated a sound and inclusive effort by the Council and NOAA Fisheries to define a forward looking conservation approach to fishery management. In April of 2004, the Council will finalize its management policy and the FMPs will be amended accordingly. In taking that action, the Council will determine a clear direction for the foreseeable future of the groundfish fisheries. In addition to the various goals set in the management policy, specific objectives provide the Council a benchmark against which to measure future management actions. In adopting that policy, the Council will be proceeding with a clear roadmap for groundfish fishery management.

A shared goal of the Councils and NOAA Fisheries is to streamline our regulatory process to provide more timely implementation of management actions, and reduce litigation as a driving force in the management of our fisheries. We are striving to accomplish this goal through improvements in our analyses of all proposed management actions, more timely internal review of analyses and other regulatory documents, and development of more specific guidelines for the preparation and processing of management actions through the Council/NOAA process. Critical to the success of this initiative is compliance with the requirements of various applicable laws governing our process, including the MSA, Endangered Species Act, Regulatory Flexibility Act, Administrative Procedures Act, NEPA, and various Executive Orders. We also believe that such compliance, and overall streamlining of the regulatory

process, would benefit greatly from legislative clarifications regarding the overlapping, and often redundant, requirements of these various laws. For example, the Magnuson-Stevens Act and NEPA (as well as the APA) contain many similar requirements in terms of content of analyses, but they contain very different requirements in terms of process and timing. These requirements are in conflict in many cases. Reconciling these various Acts, perhaps by specifying a predominant, guiding Act for fisheries, could greatly streamline the regulatory process, and reduce litigation based on procedural issues. This could be done without compromising the underlying conservation intent of any of these laws, and without compromising the open, public process. We believe that reducing this regulatory complexity is one of the greatest challenges facing our fisheries management process.

We anticipate that ecosystem-based management will be required for U.S. fisheries in the future. Based on our experience with developing ecosystem-based policies for North Pacific fisheries, we recommend that practical steps be taken to implement a national ecosystem-based approach to fishery management. First, we recommend that each fishery management council to report to Congress on how they are meeting the National Research Council's eight recommendations to achieve sustainable fisheries using an ecosystem-based approach. Additionally, each Council should establish an Ecosystem Committee to provide a forum for information exchange on ecosystem research and ecosystem-based management. Second, we suggest that NOAA Fisheries to prepare an annual "status of the ecosystem" report (similar to the requirement for stock assessment and fishery evaluation reports) that contains ecosystem indicators (socio-economic, environmental, ecological, and fishery indicators) for each region. Lastly, we recommend that NOAA Fisheries to develop technical guidelines (that are not regulations) to assist Councils with preparing fishery ecosystem plans that include clear goals and objectives. Research will be necessary for full implementation of an ecosystem approach, and fishery ecosystem plans should be modified as new information becomes available.

Alaska Fisheries Science Center

Related to overall ecosystem considerations, it is a fact that some groundfish stocks in the North Pacific are currently at all-time high abundance levels. These include pollock, halibut, and other important commercial flatfish stocks. Due to climactic regime shifts or other factors, it is likely that decreasing abundance levels of these species will occur, and our management system is designed to adapt to such changes.

Summary

The current fisheries management process — a partnership of the Councils, NOAA Fisheries, and the affected industry and public — provides a framework for successful fisheries management. This process has worked well in the North Pacific. The North Pacific Council has adopted a long-standing, precautionary approach to fisheries management, supported by an underpinning of sound science, and by a fishing industry with a priority toward long-term sustainability. Strict catch quotas for all managed target and non-target species, coupled with an effective monitoring program, form the foundation of our conservative management approach in the North Pacific. As a result, groundfish harvests have been maintained in the range of three to five billion pounds annually since 1976, and no groundfish stocks are overfished or being subject to overfishing. Notwithstanding this success, the Council and NOAA Fisheries continue to develop new and innovative approaches to address issues such as bycatch, protecting habitat, overcapacity, and protected species considerations.

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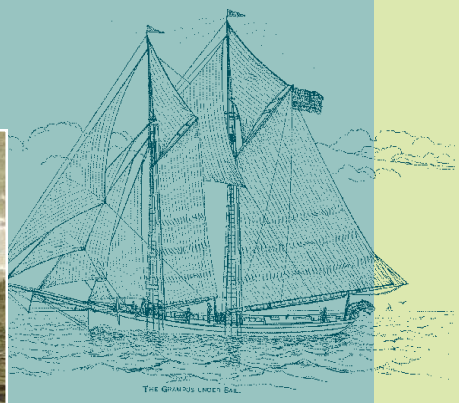

Section III.

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Regional Fishery Management Councils

I. Fisheries Governance

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The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Jay Ginter

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976 established a new era of managing marine fisheries. A central purpose of the Magnuson-Stevens Act was, and continues to be, "…to conserve and manage the fishery resources found off the coasts of the United States…" Congress envisioned this purpose, among others, to be accomplished through the work of a new suite of eight advisory bodies called Regional Fishery Management Councils. The purpose of this panel was to evaluate how well has this system of governance worked, and examine where improvements could be made.

To begin, recognition was given to the distinction between "governance" and "management." Governance refers to the entire process by which laws, procedures and institutions address fisheries issues. This process includes the entire range of activity from stakeholders representing their concerns to Councils, through the Councils developing and analyzing policy alternatives, choosing a preferred policy, developing implementing regulations, and enforcing them, while also contending with the intervention of courts, state legislatures, and Congress. Management, on the other hand, refers to the ministerial process of carrying out a Council's approved management policies through rule implementation, monitoring and enforcement. Hence, governance may include management but the two are not the same. Councils are more part of governance than management but, as they exist at the frontier between the two, Councils arguably have a foot in each camp.

One indicator of how well the Council form of fisheries governance has worked is the conservation of fishery stocks under Council jurisdiction. The results are mixed, with some Councils maintaining a good record of conservation, and other Councils having more difficulty achieving conservation objectives. Overall, most fishery stocks are not overfished and overfishing is being prevented or curtailed. Rebuilding plans have been developed by the Councils for overfished stocks or to prevent overfishing, and have been successful in some cases. In other cases, however, overfishing has been

allowed to occur or continue and new overfished stocks have been identified based on the definitions of "overfishing" and "overfished" developed by the Councils to protect these stocks. Other conservation-related challenges include protecting the habitat essential to important species, and limiting the effect of fisheries on species protected under the Endangered Species Act.

From a social and economic perspective, another measure of success is the health of the fishing industry (commercial and recreational) and its contribution to the economies of national and local fishing communities. Economic growth in the harvesting sector, of course, is limited by the finite amount of fish that may be harvested from any stock without damaging its future productivity. Having more harvesting capacity than is necessary to take the amount of fish that may be safely harvested is economically wasteful. Nevertheless, this condition continues to afflict most of the Nation's fisheries. Most Councils have not been able to successfully treat the inherent inefficiencies of open access fisheries due to the real and perceived social costs on fishing communities of limiting access. While rights-based management regimes have demonstrated benefits, like all fishery management policies, they produce winners and losers. Moreover, rights-based systems are no panacea for all fishery management issues. Indeed, while a rights-based regime may resolve some issues, it likely will create new issues and exacerbate others.

Panel discussion focused on several concerns relating to the structure and operation of the Councils.

Separating Scientific from Allocation Determinations

The Regional Councils are essentially political organizations. Their job is to make policy decisions about the management of fisheries. Frequently, these decisions are made with insufficient scientific information, but with an abundance of public testimony on what people want. Weighing the competing interests of a Council's stakeholders — commercial, recreational, environmental — produce difficult choices. This is inherently political work as the "right" choice for one stakeholder may be the "wrong" choice for another. These choices may be easier if the oceans produced an unlimited supply of the desired fish species, but of course, this is not realistic.

An emerging theme is that questions of how much fish should be harvested should be based strictly on scientific data and applicable theory and not be subject to political persuasion. Advocates of this theme contend that the statutory mandate to conserve takes precedence over the need to maximize yield. Moreover, Council members selected for their broad understanding of fisheries and constituent support are rarely trained as fishery scientists and therefore may be more persuaded by political arguments than scientific ones. Additionally, some appointed members have direct financial interests in the fisheries, or represent fishing industries. Faced with inevitable uncertainty of the scientific

"Because the Regional Fishery Management Council structure contains so many of the characteristics that the Commission believes are important, even though there are undeniable problems with the system, our approach has not — and I emphasize that — has not been to focus on wholesale changes to the Councils or replacement with a new management construct. Instead, the Commission's recommendations seek to substantially strengthen the Council and Interstate Commission structure and processes."

Paul Sandifer

NPFMC

Participants at the *Managing Our Nation's Fisheries* conference, November 2003.

WPFMC

Western Pacific Council hosts a fish fry.

"We want some separation between science and management, so that the science is undisputably peer-reviewed, objective science. We also want the science to be responsive to management needs. Everybody in here who's working in fishery management knows we need the science to support us. That's still going to happen."

Rebecca Lent

"I see the mad rush to make ecosystem management the icon of fisheries management in the future. Ecosystems are a very sound concept, but let me remind you the old saying that the devil is in the details, and it certainly is with ecosystem management."

Jim Gilford

evidence, Council members may be more likely to err on the side of more harvest than to take the precautionary approach of less harvest.

To fix this problem of political pressure overriding scientific advice, some would recommend separating the decision of how much of a fish stock to harvest from the decision of who should enjoy the benefits of that harvest, i.e., the allocation decision. Some believe this could be done by a change in the Magnuson-Stevens Act to require the Scientific and Statistical Committee (SSC) of a Council to set the harvest policy for each stock, based on the best scientific information available and ample peer review, which could not be changed by the Council. Alternatively, separation of biological conservation and allocation decisions could be done by requiring conservation decisions to be made by NOAA Fisheries, based on recommendations from science and technical teams whose work would be subject to peer review.

Detractors of this separation theme, however, argue that the effect would be to focus political pressure on the SSC or the scientific body making the harvest policy decisions. Science (not just fisheries science) often involves different interpretations, assumptions and theories. The building of a consensus as to which of these scientific interpretations, assumptions and theories is superior would become itself a political process. Advocates for more harvest and those for more conservation would forward scientific positions complete with data and analyses to promote their respective arguments. Nevertheless, because qualified scientists would be evaluating the respective arguments, data sets and analyses, rather than those without scientific knowledge (and in some cases vested interests in particular outcomes), proponents of the separation theme believe that this process would result in better decisions on setting catch limits.

Council Membership

The Magnuson-Stevens Act requires the non-agency members of a Council to be appointed by the Secretary of Commerce from a list of qualified individuals submitted by the Governor of each applicable constituent state. As a consequence, some believe that the Secretary may not have an adequately balanced slate of nominees from which to select Council members, and the public's interest in the fishery resources may not be adequately represented. Those who hold this view would argue bias in Council membership in favor of either commercial or recreational harvesting. Environmental concerns, protected species conservation, and habitat protection may have been given lower priority as a result. Political bias may not be limited to extraction versus conservation, however, as some commercial (or recreational) groups may perceive that their preferred positions on some issues lack critical votes on a Council.

To address this problem, one panelist recommended broadening Council representation to provide for greater balance on the Councils. Governors could be required to nominate a balanced slate of individuals that includes not only commercial and

recreational fishing interests, but also members of the general public without a fishing industry interest, including conservation groups. Nominations also could come to the Secretary from an independent body, such as the National Academy of Sciences, rather than having all nominations come through the Governors.

Another reform advocated by one panelist is to apply the same financial conflict of interest standards to the Councils that apply to other government decision-makers. Under the MSA, a Council member is free to vote on a management action unless the member enjoys an expected and substantially disproportionate benefit…relative to the financial interests of other participants in the same gear type or sector of the fishery. Under NMFS regulations, only if a Council member's interest is greater than 10% must they recuse themselves. As a result, Council members are allowed to vote on matters in which they have some financial stake.

A concern raised by the perceived bias of a Council's membership is that stakeholders who do not get what they want through the Council system then take recourse through the courts or Congress to achieve their desired policy outcomes. These "end runs" around the Council process of setting fishery management policy, some would argue, indicate a breakdown of this governance system. Another potential breakdown stems from political pressure on state fisheries directors or other Council members who may be seeking re-nomination to a Council from their respective state governors. A state governor, it could be argued, has an exceptional degree of political influence over his or her fisheries director who has a voting position on a Council and over other incumbent Council members who wish to be reappointed for a second or third three-year term. Hence, the political forces affecting a governor may be directly relayed to effect a Council decision that may otherwise have been different without real or implied gubernatorial intervention. Regardless of whether intervention in Council policymaking comes from Congress or a state governor, the result is the same. That is, Council policies could potentially reflect less the perspective of regional stakeholders and more the perspective of a few with exceptional political influence.

The views represented in the panel discussion of this and related issues suggested alternative perspectives. One view is that politics are a fact of Council life. Councils are, after all, political organizations that make policy concerning public resources. Virtually any Council decision will produce winners and losers. On any particular issue before a Council, the backgrounds of Council members may suggest a predisposition. The antidote to this tendency is to assure that scientifically based analyses are presented and that Councils have a rational basis for the decisions they make. The greater the public perception is that Council decisions are scientifically and rationally based, the less likelihood there is that stakeholders will mount "end runs" on Council decisions.

"One of the most fundamental challenges that the Councils face is the undeniable social context of fisheries management. We constantly face the tug and pull between our biological objectives and responsibilities under the Act and the resulting impacts that are felt by the participants within the fisheries and the communities we deal with."

Tom Hill

SAFMC

Public participation is vital to the process.

"We believe the single most important thing that could be done to improve fisheries management in this country is to reform the governance structure."

Sarah Chasis

WPFMC

"End runs… consisting of litigation and Congressional intervention… reflect some flaws in our overall governance structure that need to be addressed. If the system was perceived as legitimate and working well, this phenomena of end runs would go away or at least be significantly reduced."

John Sutinen

"It was time to have a national forum and a national debate, bring all the folks to the table and talk the issues out, and do it in an open manner. That's what the Council process does. We're not afraid of that. We're not afraid to be criticized. And we're not afraid to accept the fact that maybe we've actually done a few things right."

David Benton

Litigation has been effective in reinforcing a conservation and environmental ethic in the outcome of Council actions, while Congressional intervention (outside of re-authorization statutes) or gubernatorial intervention has focused more on allocation issues. Mounting one of these "end runs," however, can be costly. Courts are reluctant to second guess the expertise of the Secretary in implementing fishery policy and Congress would prefer for fisheries issues to be resolved by the Councils. However, NOAA Fisheries has lost some cases in recent years because the Magnuson-Stevens Act requirements or NEPA regulations have not been adequately addressed.

Another potential antidote to undue political pressure on Council members is to create incentives to better align the economic interests of stakeholders in a fishery with the broader long term public interest in conservation. Some panel discussion suggested that certain rights-based fisheries management regimes, in which fishermen hold long-term harvesting privileges, would reform short-term perspectives characteristic of open access management regimes. A fisherman who buys his way into a fishery through the purchase of a share of the overall quota, for example, is less likely to support aggressive fishing mortality policies that keep stocks depressed because an abundant stock in the future would add value to his quota share.

Legal Implementation Requirements

To be approved by the Secretary, a recommended Council policy must be consistent with the MSA and other applicable law. The "other applicable law" requirement includes roughly a dozen statutes and a half dozen Presidential executive orders. A common frustration of Councils is that the process of developing the analyses and associated paperwork to satisfy all applicable requirements severely impedes the implementation of their desired policies. The elapsed time from Council recognition of a management problem through development of a recommended policy to the Secretary to implementation of rules may now exceed two years or more.

Requiring Councils to stop and think about the potential effects of a recommended action on the fish, habitat and people is not a bad idea. Some panel members, however, sought relief from some of these statutory requirements, or wanted improved Council member training on how best to deal with them. Under the NOAA Fisheries regulatory streamlining initiative, more of the analytical and regulatory work would be completed by the Councils and reviewed by NOAA Fisheries early in the process. This should not only speed Council submitted documents through the Secretarial review process but also increase public involvement and transparency in the Council process of developing policy.

Summary

Panel discussion indicated that some believed no changes were needed in the current system of governance involving Councils as the principal developers of fishery management policy. Others suggested minor changes to improve the process, while others would have more major changes. The changes suggested would range from the integration of science into harvest policy decisions (such that scientific advice would be more resilient in the face of political pressure to exceed science-based levels) to altering the role and composition of the Councils. A complete restructuring of the current Council system of governance, however, likely would be too costly and confusing for the public. One panelist suggested that, while each of the component parts of the system, like an orchestra, may play different instruments, with cooperation they combine to make beautiful music.

The need for more scientific work on the interaction of species in fisheries also was highlighted as we move into ecosystem-based management regimes. The growing recognition of environmental concerns of the public interest in fishery resources also is having an effect on Council recommendations. This is partly in response to a growing presence of environmentally concerned stakeholders and partly in response to the 1996 amendments to the Magnuson-Stevens Act. Overall, this is likely a positive development as increased public participation at the regional level likely will stimulate investments in scientific inquiry while challenging old paradigms.

"The fisheries management system is not broken."

Terry Leitzell

NPFMC

Panel participants at the *Managing Our Nation's Fisheries* conference, November 2003.

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2. Rights-Based Management

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Joe Plesha
Trident Seafoods

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The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Mark Fina

In recent years, "rights-based" fishery management has become one of the most controversial management issues in U.S. fisheries. In a "rights-based" management structure, privileges to harvest specific portions of the total allowable catch (TAC) are allocated to identified individuals or groups of individuals.[1] Individual Fishing Quotas (IFQs), Individual Transferrable Quotas (ITQs), allocations to fishing cooperatives, and community allocations are all forms of rights-based management. Advocates of rights-based management believe that safety, conservation, and economic benefits can be realized through a properly defined program. Opponents, however, question the fairness of rights-based programs and remain concerned that these programs can be disruptive to fishermen, processors, support industries, and communities.

A basic component of any rights-based program is the division of the TAC, a strict limit on total harvests, into individual allocations. The environmental benefits to stocks of limits on total catch are clear. A TAC can be used outside of rights-based management; however, this may create other problems. In a management program that is not rights-based, the use of a TAC typically spawns a "race for fish" as each fisherman attempts to maximize returns from the fishery by maximizing harvests. The race for fish has several detrimental impacts. Safety can be compromised by fishermen that fish through poor weather because they fear a loss of revenues. Fisheries tend toward excess capacity and overcapitalization as participants enter more vessels and increase the catching power with added gear or increases in other inputs to improve their harvests. Entry and gear limitations can mitigate overcapacity, but often provide no mechanism for removal of excess capital. Returns are also reduced since fishermen do not time their harvests to serve market demand, but instead time harvests to secure their position in the fishery. In a race for fish, a fisherman's revenues depend more on success in the race, and less on success in the marketplace. Quality suffers as time pressures limit the ability of harvesters and processors to derive the most value from

[1] Note that "rights-based" is somewhat of a misnomer, because these programs allocate revocable privileges, rather than compensable rights.

products. Bycatch problems are exacerbated if harvesters are reluctant to adopt measures to avoid bycatch that might slow harvest rates of target species. At the extreme, a race for fish can also threaten the stock of the target species. If harvest capacity exceeds the ability of managers to control total harvests, even very limited openings can result in harvests that substantially exceed the TAC. For example, prior to implementation of the IFQ program in the North Pacific halibut fishery, the use of a series of 24 hour openings often resulted in harvests in excess of TAC.

In a fishery in which strict limits on harvests are imposed, rights-based management can overcome many of the shortcomings of input controls. Generally, allocations in a rights-based program are transferable shares that may be harvested at the discretion of the holder. Fishermen do not risk a loss of catch by deciding not to fish in poor weather. In addition, share allocations allow the fisherman to time harvests to meet market demands with greater attention to quality, in order to realize maximum return from each pound of fish. Input and effort choices can be made to minimize the cost of harvesting the allocation without risk of losing a share of the catch. Most share allocations, however, are subject to limitations intended to achieve environmental and social goals. Seasons are defined to protect spawning stocks. Gear and vessel type and size limitations can be used to protect stocks and habitat, reduce bycatch, and achieve social goals, such as maintaining a small vessel fleet. Limits on leasing and owner-on-board requirements may be applied to maintain an owner-operator fleet. These transferable share allocations also provide a mechanism for voluntary and compensated removal of excess capital from fisheries, as remaining fishermen aggregate shares on fewer vessels to achieve efficiencies.[2] Although rights-based management was developed to respond to an economic problem in fisheries management, a rights-based program need not sacrifice social and environmental objectives.

Notwithstanding the potential benefits, rights-based management is among the most controversial management issues in U.S. fisheries. The controversy stems from both intended and unintended consequences that may arise in a rights-based management program. The initial allocation of shares, which apportions the catch among participants, will determine winners and losers in the program. Questioning the fairness of the initial allocation often leads to questioning rights-based systems in their entirety. Allocation battles intensify if all of the affected parties demand to be represented in the initial allocation. Hired captains and crew, processors, and communities that support a fishery may rightfully contend that their interests should be considered. Consolidation, which may contribute to improvements in economic returns, often results, as stronger participants purchase interests of others. Consolidation, however, can often change the character of a fishery, particularly if relatively larger industrial and corporate interests purchase the interests of more traditional, small-scale participants.

[2] Unlike buyback programs, these decisions of participants in rights-based management programs are made at the individual level (rather than the collective level). Each share transaction represents the two parties' decisions concerning the specific levels of interest they wish to maintain in the fishery. This more precise interest accommodates far greater diversity in the fleet and allows fishermen wishing to experiment with new techniques the opportunity to do so without loss of catch. Since shares can be resold, a harvester can change his mind.

"Let the market health address some of the major problems facing the fisheries today."

HANS RADTKE

"The flexibility to adjust the program in response to industry and agency input is one of the hallmarks of our (halibut and sablefish IFQ) program."

ARNE FUGLVOG

"In our hearts, we value our communities, and we're afraid that they are going to be changed forever by moving into a system of ITQs."

PAUL PARKER

MAFMC

"IPQs will do nothing to accomplish the efficiency benefits of IFQs, the safety benefits, or the conservation benefits. All they would do is redistribute the single pie that is available to be distributed."

Robert Halvorsen

"I know there's a lot of controversy throughout the nation about including processors in an IFQ system or rights-based fishery management system, but…it really comes to this issue — processors and vessel owners are in the same boat."

Joe Plesha

Federally-Managed U.S. fisheries Currently Governed by Rights-Based Management

- Mid Atlantic surf clam and ocean quahog fisheries.
- South Atlantic wreckfish fishery.
- Alaska halibut and sablefish fisheries.
- Bering Sea pollock fishery.

Several factors have intensified the controversy surrounding rights-based management. The lapse of the recent IFQ moratorium, together with perceived successes of rights-based programs, have stimulated efforts to extend rights-based programs to new U.S. fisheries, including the Gulf of Mexico red snapper fishery, the Gulf of Alaska groundfish fisheries, and the Bering Sea and Aleutian Islands crab fisheries. The program developed by the North Pacific Fishery Management Council for the crab fisheries would create a new type of shares —"processor shares" — intended to parallel the allocation of harvest shares. Processor shares are intended by the North Pacific Council to protect the long term interest and investment of processors in the fisheries by creating a privilege to receive and process a specific share of the TAC. Under the program, the holders of harvest shares would be required to sell a portion of their catch to a holder of processing shares. Processor shares, however, have drawn criticism from several corners, including the Department of Justice, which questions the infringement on competition that would arise from allocations of the processing market. The controversy has spilled over into efforts to fashion new legislation governing the development of future rights-based management programs in the MSA reauthorization. Bills have been introduced creating guidelines for development of rights-based programs including both extraordinary procedures for their adoption (such as referenda requirements) and substantive program requirements (such as sunsets and fee provisions to cover the costs of administration). As these efforts continue, advocates of rights-based management remain concerned that some of the opposition arises from a lack of understanding of rights-based programs, and the potential and versatility that they offer.

The ability to design a program to reduce negative impacts is critical to addressing controversy and developing acceptance of any management program. In rights-based management, clearly the most controversial element of the program is the initial allocation. A narrow allocation has the potential to make some participants very wealthy, leaving others with little or nothing. In making the allocation, it is important to recognize that diverse individuals and groups are likely impacted by the change in management. Vessel owners, captains, crews, processors, communities, and support industries all may be impacted by the change in management. Vessel owners will have capital investments at stake under a new rights-based program. Most rights-based programs allocate shares based on past participation or investment in vessels, using vessel size or power as a proxy for capital investment. Fleet consolidation, which could result, would affect captains and crew. Although remaining crew jobs could provide steadier employment and benefits, some crew are likely to lose employment. Demand for the remaining crew positions could also be exploited by some vessel owners that perceive an opportunity

to reduce crew shares. Possible negative impacts to crew, however, could be addressed through a separate allocation to crew or through other protections that could be incorporated into the program. A program can also be designed to address the concerns of processors, who have the potential to lose market share, if landings are redistributed. Processing capacity typically keeps pace with a race for fish. At the extreme, when a race for fish is ended by a rights-based program, harvests that were processed over the course of a few days or weeks can be spread over a period of several months leaving some processing capital completely idle. Redistribution of landings can also affect communities and shore-based support businesses. Direct allocations to community groups may be used to address these impacts. The initial allocation should balance all of the competing interests against the practicality of a broad inclusive allocation of shares.

When attempting to address potential inequities in an initial allocation scheme, it is important not to sacrifice the overall operational design of the program. For example, distributing shares too broadly can result in many small allocations that cannot be fished economically. In the long run, these shares can be expected to be consolidated with larger holdings, but at the outset they are likely to be unfished. An alternative approach might be to develop a compensation fund to address potential inequities of the allocation. The increase in value of the fishery that is likely to occur with the move to a rights-based program should create an opportunity to compensate persons that might be harmed by the program. For example, crew benefits and a low interest crew loan program funded by landing fees may be an effective means of reducing the impact of an allocation on crew and facilitating their entry to the rights-based fishery. Attempting to address different participants' concerns by creating several different types of allocations can also impede the realization of benefits of a program. Provisions that directly allocate processing, such as processor shares and other explicit processor landing requirements, may lead to a very complex management program that requires the development of contractual relationships between specific harvesters and processors. While these protections may be manageable in industrial fisheries with few participants who can effectively overcome the complexities, a limiting, overly complex structure could diminish the benefits that arise from the move to a rights-based program. Less complex means of protecting interests, such as allocating harvest shares to processors, should be explored to ensure that benefits are maximized under the program.

Managers developing rights-based programs often overlook that these programs typically grant a long term interest in a public resource. Granting long term interests are typically justified by the need for business planning and possible stewardship benefits. While investments require a tenure of reasonable length, granting an interest in perpetuity likely cannot be justified on these grounds alone. Likewise, any potential stewardship benefits are not likely to obviate the need for agency management and oversight in the fishery. A cost free initial allocation can be justified by the need to minimize transitional impacts of moving to a rights-based program. Because participants in fisheries determine their investments based on the existing regulations, changes in regulations can be very

"Any ITQ system that intends to benefit existing participants, that provides security to harvesters, to processors, and to communities, must allocate quota to these participants or provide explicit protection measures."

SCOTT MATULICH

NOAA Fisheries

Pollock caught during fish stock assessment surveys on the *R/V Miller Freeman*.

"Despite all the blather about property rights and rights-based fishing, it's simply the assignment of catch that provides this magic. We have to be very honest about what we're doing. What we are doing is gathering public wealth and putting it in a pile on the table…and we're pushing that pile of money over to select groups of people."

Seth Macinko

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disruptive to business planning. A transition period will allow for adjustment to the change. With these existing investments in mind, the public capture of benefits of the resource could be accomplished by scheduling a gradual expiration of initial allocations and the auctioning of additional long term tenures in the fishery. Social goals, such as maintaining fleet characteristics, can be accomplished by defining eligibility to participate in auctions and imposing limits on the use of shares. For example, a portion of any auction could be limited to participants from certain communities or could limit the harvest of shares to vessels of certain size and gear. Similar provisions may be critical to achievement of social goals under any rights-based program and should be considered in the program design.

Any management program must be designed for the specific characteristics of the fishery. Rights-based management programs may differ substantially based on the particular needs and circumstances of a fishery. Rights-based programs can be developed to meet clearly articulated environmental and social goals, while still providing flexibility necessary to achieve the many of the benefits common to rights-based management. For example, a common criticism leveled at rights-based programs is that they result in excessive fleet consolidation that is detrimental to participants and has social harms. Well-chosen limits on aggregation of shares by an individual or company can effectively prevent undesired overconsolidation. Appropriate limits are likely to vary by fishery, as a large industrial fishery may not require the same caps that limit excessive shares in a small boat fishery. Industrialization of the fleet can also be avoided by imposing limits on leasing and owner-on-board requirements. Similarly, rights-based management is often argued to create a barrier to entry.[3] Restricting consolidation of small share allocations can be used to ensure that a substantial number of small holdings remain in the market to facilitate small-scale entry. Alternatively, limits on the tenure of shares (with auctions to reissue expired shares) may reduce share prices and increase fluidity in the market, affording smaller participants the opportunity to enter and remain in the fishery. In a program with a limited share tenure, care should be taken to balance the benefits of lower prices and a more active share market against the prospect that short terms could limit the ability of purchasers to obtain financing for share purchases and to engage in business planning.

Elements of the Alaskan Halibut and Sablefish IFQ Program that Preserve Character of the Fishery

- Caps on excessive shares to prevent consolidation and industrialization.
- Classification of shares by vessel size, type, and gear.
- Owner-on-board requirements and limits on leasing.
- Crew loan program to facilitate entry.
- Limits on aggregating relatively small allocations to facilitate entry.

[3] It is not certain that entry to a fishery subject to a rights-based program is always more difficult than entry to fisheries subject to other management. For example, it might be easier to gradually enter a fishery managed by a rights-based program by purchasing a few shares at a time, than to enter a program regulated by a limited entry licensing program, where entry would require the purchase of both a license and a vessel.

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Developing constraints on a rights-based program to ensure social goals are met requires careful balancing of the social benefits of those constraints against their impacts on benefits typically derived from rights-based programs. Generally, a conservative approach should be used in developing a program, as adding constraints may be difficult after the program is implemented. For example, lowering share holdings caps may be politically or practically ineffective if the proposed lower caps are previously exceeded by consolidation. Managers should also be cognizant of the relationship between various aspects of rights-based management and the specific benefits they generate. Transferability of shares is important, if a program is intended to facilitate decapitalization. Efficiency benefits may also be derived, if a program permits transfers, since more efficient participants will likely purchase shares from less efficient participants. While limits on transfers may be appropriate to achieve social goals, outright prohibitions are an impediment economic benefits. Likewise, sunsetting a program could be an obstacle to business planning, with similar consequences for the realization of economic benefits. Sunsetting a program could also compel managers to revisit confrontational allocation decisions. Effective program review is an important component of any management program. Managers need to commit to gathering better data and information to fully understand the consequences of their management decisions. A commitment to modify management programs to mitigate negative impacts is also necessary.

As fisheries management progresses, managers must take an honest approach to assessing the potential benefits and harms that can arise from rights-based management. In some areas (including those in which rights-based management programs are in place), reasonable fears of the consequences of rights-based management have arisen from real and perceived consequences of existing rights-based programs. In time these fears will be overcome, if proponents of rights-based programs commit themselves to educating others concerning the benefits the programs offer and methods to avoid potential pitfalls that have created the apprehension. This education is critical if rights-based management is to gain broader acceptance and be introduced in more fisheries. Fishermen that currently benefit from rights-based management should share their experiences with fishermen in other areas. Cautions that rights-based management should not be forced on unwilling participants should be heeded. Stakeholder acceptance is a paramount consideration in developing management programs and is a foundation of the Council process embodied in the Magnuson Stevens Act. Regional Councils are probably the most suitable venue for development of management programs, since local stakeholder involvement is greatest in the Council process. Through this process, well-designed programs can be developed that generate benefits to be shared by the varied interests that rely on a fishery.

"Rights-based management programs have the potential in many fisheries to produce economic and biological results that are superior to those obtained by traditional fisheries."

Lee Anderson

"It is important to recognize that there is a way to divide the economic pie, making everyone in the fishery better off."

Pete Emerson

Wm. B. Folsom, NOAA Fisheries

3. Protecting Community Interests

Synopsis written by Nicole Kimball

Moderator:
Stephanie Madsen
North Pacific Fishery Management Council

Rapporteur:
Nicole Kimball
North Pacific Fishery Management Council

Participants:
David Bergeron
Massachusetts Fishermen's Partnership

Joe Sullivan
Mundt MacGregor

Hazel Nelson
Bristol Bay Economic Development Corporation

Dr. Kathi Kitner
South Atlantic Fishery Management Council

Dr. Madeleine Hall-Arber
MIT Sea Grant College Program

Paul Bartram
Hui Malama o Mo'omomi Moloka'i, Hawaii

Frank Kelty
City of Unalaska/ Dutch Harbor, Alaska

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

(Photo above)
Boothbay Harbor, Maine.

Fishing communities exhibit significant variation in their geographical, social, cultural, and economic characteristics. However, whether a small coastal village or a large metropolitan area, many coastal and inland communities depend upon healthy fisheries and a healthy fishing industry to serve as a vital part of their social and economic structure. Often as important to an individual community's identity are the cultural aspects related to a long-term fishing tradition. While there exists a clear link between fisheries and the coastal communities in which they are based, communities have not always been well represented as participants in the fishery management process. As the linkages between communities and the fishing industry are better documented and understood, there is greater emphasis on recognizing and including fishing communities in decisionmaking on local, regional, and national levels.

A community is identified primarily by either a spatially bounded geographic location or a group of people with shared interests and concerns. The 1996 amendments to the Magnuson-Stevens Act (MSA) added a definition of "fishing community" and required fishing communities to be considered in the development of the fishery impact statement and any proposal for a limited access program. In the MSA, the term "fishing community" means a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and U.S. fish processors that are based in such communities. The 1996 amendments also added National Standard 8, which requires that conservation and management measures in fishery management plans "shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (1) provide for the sustained participation of such communities, and (2) to the extent practicable, minimize adverse economic impacts on such communities."

NOAA Fisheries has noted that the MSA definition of community is of a group of fishing participants based in a *geographic* location; thus, consideration of fishing communities under National Standard 8 is limited to geographic communities that are substantially dependent on or substantially engaged in our Nation's fisheries. While several regional Councils have been aware of incorporating community concerns into their management processes long before the amendments to the MSA, this law, as well as requirements under NEPA to consider the impacts of major federal actions on the human environment, provide a formal authority for the Councils' consideration of community impacts.

The purpose of including community interests in fisheries management systems is primarily to maintain sustainable and resilient fishing communities. Most industry, community, and government participants alike agree that the overall goal is to protect the needs of fishing communities, which are largely based in their identification as fishing communities, economic growth, environmental protection, social equity, and cultural values. Yet the question remains of how to protect something that we have yet to identify in a standardized and comprehensive way. The relationships between the fishing industry and the infrastructure and residents of fishing communities are complex, diverse, and often intangible. Adding to this complexity is the fact that the quality of the socioeconomic data is often variable, or the data are potentially inaccessible due to confidentiality concerns.

There is an increased interest in the fisheries management system in the U.S. to document community fisheries interactions and provide Councils with the tools for social impact assessment, in an effort to protect coastal communities from adverse impacts of fishery management actions. Integrating social science into the analytical documents supporting the decisionmaking process is an ongoing challenge for most regional Councils, but it is one of the primary ways to ensure that decisionmakers are provided with the complete picture when it comes to considering community impacts. The social science provided to support community considerations is often criticized as less rigorous than the economic data supplied in the same analysis, and Councils often rely on anecdotal evidence or public testimony to provide them with the information they need to understand the full impact of a proposed management action. As the analytical documents provided to support a Council decision are increasingly scrutinized, the Councils are addressing the lack of sufficient data and making social science a greater priority in the overall system. Only then can regional Councils and NOAA Fisheries analyze cumulative impacts and generate a better informed debate.

The panel members identified various ways that the Councils could improve the social impact assessment process. Several of the recommendations were related to setting a higher national priority for this type of information. NOAA Fisheries is responding by creating and hiring for several new anthropologist or sociologist positions, both at the national and regional level. The Councils and NMFS should employ social scientists on their staffs, use the regional NMFS staff, or utilize

"We cannot have healthy fishing communities without healthy fish stocks."

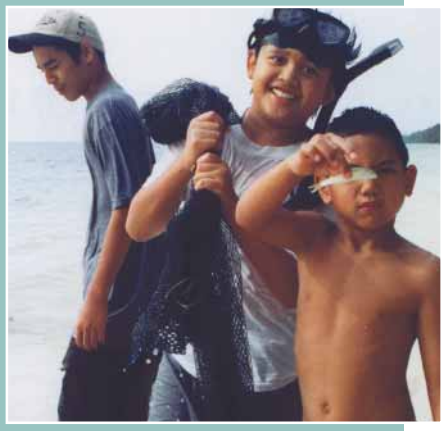
JOE SULLIVAN

"Through the CDQ Program, our communities are building fisheries related infrastructure to improve the quality of our seafood and to provide markets where residents need markets."

HAZEL NELSON

Greg Cashen

CDQ groups in Alaska acquire equity interests in seafood companies.



WPFMC

"As we are learning, the best way to integrate social science into fisheries science is to have the social science available at the beginning of the management process, not at the end."

Kathi Kitner

qualified consultants when undertaking social impact assessments. In addition, Councils should include a social anthropologist on their scientific advisory panels and relevant Council appointed committees. Having direct access to the expertise necessary to address community interests, both during development of social impact assessments and decisionmaking, are key components to meeting the mandate of considering impacts on communities.

There needs to be a priority for funding social science research and developing the necessary scientific surveys. There is a long recognized need for standardized socio-economic data collection, and the funding for such data collection will be a significant factor in the realization of this goal. Social and ethnographic data collection cannot be performed in isolation, and clearly require participation on behalf of the communities of interest. A collaborative research process between government scientists and community and industry stakeholders has been generally touted as a productive and successful method for garnering and improving the information needed, while building stakeholder support and knowledge in the process. A collaborative research program in New England, for instance, has spurred much support from fishermen and coastal community representatives. The key components of this program include scientific and institutional support from NOAA Fisheries for fishermen with research proposals, combined with a well established community association to organize, coordinate, and assist with the proposals. This type of program promotes a consistent dialogue between the entities, which can lead to better data, and eventually, better program development.

Similar to the need to identify fishing dependent communities, there is a need to identify what it is fishery managers and community residents are trying to protect. The differences between various fishing communities are important to document: the history, geography, relative level of dependence on the fishing industry, values and norms, and long-term goals for the community, are all significant factors in determining an appropriate action. The involvement of stakeholders through collaborative research is thus one way to incorporate community needs and knowledge into the decisionmaking process. This approach is typically recognized as a "bottom up" approach to managing our Nation's resources, and is a common theme emphasized by many community representatives and local governments. Use of local, cultural, and traditional knowledge is critically important to achieving a better understanding of the impacts of a proposed regulatory change and potentially innovative solutions. In this way, including local resource knowledge is beneficial to both the resource and the participants in the process, and can stimulate community driven initiatives that are well supported and successful.

Preliminary recommendations from the U.S. Commission on Ocean Policy and recent recommendations from the Pew Oceans Commission appear to lean toward changes that reduce the role of the existing regional Councils in fisheries management, complemented by a stronger role for agencies at a national level. While changes to the representation on the Councils may be recommended to reflect a broader interest, many perceive the greatest benefit of the Council system to be its regional approach. The Council system was designed to allow local, knowledgeable

stakeholders to participate directly in the development of fishery management plans and amendments, and this attribute is one of the system's greatest strengths. The panelists emphasized the benefits of managing from the local and regional level, and cautioned against the use of "top down" management from a national agency which may have a much broader interest, and be less responsive to and knowledgeable of fisheries needs on a local level. Because fishing communities are so variable, it is inherently understood that communities both within and among regions will require different protection measures. One way to respond to this need is by incorporating local and traditional knowledge into the analytical and public policymaking process, in part by providing for a stronger community presence in the Councils' advisory panels and appointed committees.

"Our communities are adapted to the places and to the resources bases that we have."

Paul Bartram

Although National Standard 8 recognizes the importance of fishery resources to fishing communities and requires the Councils to consider community impacts, there remains a fundamental question of how to balance the requirements of this standard with the other national standards in the MSA. National Standard 8 states that "conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities..." [MSA 301(a)(8)]. Thus, it is fairly clear that measures to protect community interests must remain consistent with the overall conservation goal of fisheries management to "prevent overfishing, while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." [MSA 301(a)(1)]. In effect, if a core conservation measure is necessary, it follows that community interests are of secondary priority. However, greater ambiguity exists when balancing national standards other than National Standard 1 against one another, as there is no explicit hierarchy to their importance. Requirements that Councils consider efficiency in the utilization of fishery resources, as stated in National Standard 5, for example, may or may not take precedence over the consideration of community interests under National Standard 8. Regardless, the Councils and NMFS should continue their efforts to prevent undermining one standard through the application of another. It is generally considered that National Standard 8 must be viewed in the context of all other national standards, and this contention is supported by legislative history from the 1996 amendments to the MSA. Councils must therefore engage in a balancing act, particularly when there is inherent tension among specific standards and the proposed conservation or management measure at issue is intended to serve multiple purposes.

"If you have a strong economic base in your industry, in your community — then the community is strong."

Frank Kelty

Greg Cashen

The management measures available to Councils to protect community interests are relatively broad and discretionary. Thus, it is the duty of the Councils, regional NMFS staff, and the fisheries science centers, with input from the public, to determine the necessary factors to consider when identifying fishing dependent and engaged communities and developing management measures to protect them. As several Councils move toward considering rights-based fisheries management systems, specifically individual

G. Harrington, NOAA Fisheries

Unalaska, Alaska.

"What we've found to be most effective is collaborative research. And in collaborative research, you have scientists and fishermen actually talking together, actually communicating. And I find that you can have some very unique insights come out of that."

Madeleine Hall-Arber

fishing quotas (IFQs), the public debate about access rights has expanded to include alternative access regimes that are based on geographic community interests and include communities as quota share holders. While IFQ systems are still considered relatively contentious, and continue to evolve in various fisheries among select regional Councils, there is a growing contention that community-based control of some portion of the quota is not necessarily incompatible with this market-based structure for managing fisheries. Should a community entity be integrated into an IFQ system, it will necessitate careful consideration to formulate a well-defined individual privilege that can be apportioned among community stakeholders. The Bering Sea and Aleutian Islands fisheries off of western Alaska are managed in part through a community quota system, namely, the Western Alaska Community Development Quota Program. This program directly allocates a percentage of the multi-species fisheries off western Alaska to each of six existing community entities, which represent 65 rural communities in western Alaska. While promoting a fisheries economy in communities with few alternative economic inputs, this program has also been deemed largely successful in providing training, employment, and scholarship opportunities for community residents, as well as increased local processing options for local, small vessel fleets. This program is one example of incorporating a direct community interest and community governance within a rights-based program design. Incorporation of fishing communities in the initial allocation of IFQs is one potential design for allowing community entities a direct harvest privilege within individual fisheries. In addition, Councils may authorize communities to purchase, hold, and sell IFQs in an existing IFQ program, in order to use their shares for community development and/or fisheries development purposes, or to allow fishery access to individual resident fishermen. While the benefits of a rights-based system are often recognized and touted as a means to ensure stability in the fishery, communities and fishermen alike identify similar concerns with such a system. Community concerns often include loss of a traditional or cultural identity, excessive consolidation (which begets smaller and less diverse fleets and ports), and loss of flexibility. The general philosophical approach has been that while communities may be discussed as a distinct sector, the nature of the system is such that the health and long-term sustainability of fishing communities is inextricably connected to the health and sustainability of both the resource itself and the fishing industry.

To address the challenges that lie ahead, the Councils and NOAA Fisheries should undertake collaborative research in social science, in order to lead to a better debate and understanding of the impacts of a proposed change on local and regional community levels. Panelists agree that the existing data are lacking, and there is a common understanding that our current system must focus on institutionalizing the use of social science data in conservation and management proposals and within analyses. Identifying fishing communities, determining the necessary data to be collected, and documenting the methods used to collect those data will prove critical to meeting this goal. As important will be providing communities the opportunity to have a role in both the data collection and proposal

process. Incorporating local knowledge of the fisheries and community interactions in both the research and decisionmaking stages will be crucial to recognizing and accounting for the inherent differences among fishing communities. Developing long-term relationships with community representatives will allow the Councils and NOAA Fisheries to develop more effective fishery management plans and amendments, and enhance their ability to identify and modify community protection measures when they are ineffective or no longer necessary.

Both the MSA and the Council system have been evolving since inception, in order to meet new challenges and adapt to changing biological, economic, and political environments. In terms of developing measures to consider and mitigate impacts on communities, the Council process may be regarded as being in the preliminary stages. It has taken decades to build a general conservation awareness within the public, and it is anticipated that it will take time for the community interest to become a common part of fisheries policy discourse as well. The Council process is continually developing, as Councils, NOAA Fisheries, industry sectors, conservation interests, fishing communities, and the general public learn which tools and programs are effective in fisheries management in different regions around the Nation. While several management tools are currently available, new ones are being developed and tested on an ongoing basis. Learning from each region's experience in implementing specific management tools, while recognizing the geographic, social, and economic differences among fishing communities, will contribute to the development of more effective community protection measures within our existing fisheries management systems.

"Whatever the choices are, they have to be generated from the community level."

DAVID BERGERON

Wm. B. Folsom, NOAA Fisheries

Lewes, Delaware.

OAR/NURP, University of North Carolina at Wilmington

4. Protecting Fish Habitat

Moderator:
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North Pacific Fishery Management Council

Rapporteur:
Jon Kurland
NOAA Fisheries

Panel Participants:
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NOAA Fisheries

Jim Ayers
Oceana

John Gauvin
Gauvin and Associates

Gary Caputi
Recreational Fishing Alliance

Dr. Bill Cole
U.S. Fish and Wildlife Service

Earl Krygier
Alaska Department of Fish and Game

Doug Rader
Environmental Defense Fund

Richard Taylor
Former commercial fisherman

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Jon Kurland

The conservation of important habitats for federally managed fish species is a critical component of fishery management, and is vital for building and maintaining sustainable fisheries. Nevertheless, habitat conservation is not without controversy. This panel explored the current state of habitat conservation in U.S. fishery management, its successes and shortcomings, and directions for the future.

Panelists were asked to address two questions: (1) Are the existing Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act working to protect fish habitat, and why or why not? (2) How can the fishing industry and environmental groups be more effective partners for developing reasonable habitat protection measures through the Council process? Panelists were also asked to provide an overall assessment of how the Councils have responded to the mandate to protect fish habitat.

The EFH Provisions of the Magnuson-Stevens Act

The 1996 Sustainable Fisheries Act amended the MSA to include new provisions to identify and conserve Essential Fish Habitat (EFH) in fishery management plans (FMPs). Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Under the amended MSA, FMPs must describe and identify EFH, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Prior to 1996, FMPs needed to include readily available information about the significance of habitat to the fishery and the effects of changes to that habitat, but there was no requirement to identify specific important habitats or minimize threats to such habitats.

A variety of interest groups reached consensus in the mid-1990s that habitat was an important part of fishery management and needed to be recognized more directly in the fishery management process. As encapsulated by Nat Bingham, a Pacific salmon troller from Ft. Bragg, California, during public testimony before the Pacific Fishery Management Council, "...you may regulate us out of business and not necessarily restore our fisheries — it's the habitat, stupid!" Such sentiments led to negotiations and a series of meetings between the fishing industry, NOAA Fisheries, and Congressional staff, which the American Fisheries Society helped to facilitate. Those discussions worked through differences between the parties over the definition of EFH and whether measures to protect EFH from fishing and non-fishing threats should be mandatory or discretionary, and ultimately led to broad consensus on the language that became the EFH provisions of the MSA. In the end, Congress found that: "One of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States."

"We must move to an ecosystem-based system and manage for sustainability with science-based analysis."

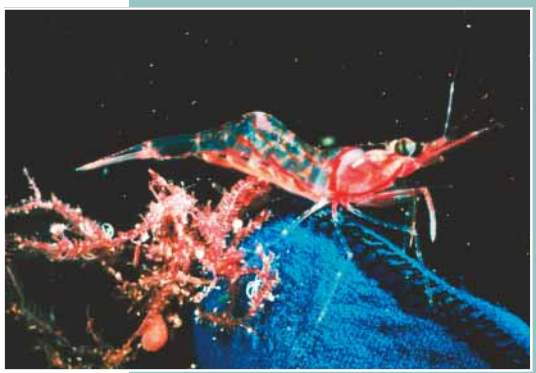
Jim Ayers

Despite the seemingly wide agreement on what needed to be done, the details of implementation proved to be very difficult to resolve. NOAA Fisheries undertook a protracted rulemaking process to develop the regulatory guidelines to implement the MSA EFH requirements, including five separate public comment periods before the agency issued a final rule in January 2002. The Councils and the agency developed EFH components for every FMP, including EFH designations for about 1,000 different species. Data limitations were significant, and it became clear that relatively little is known about the distribution of various habitat types in the ocean, or which habitats contribute most to the productivity of managed species. The requirement for FMPs to minimize the effects of fishing on EFH became especially contentious, and led to litigation challenging whether NOAA Fisheries and the Councils had done enough to minimize the effects of bottom trawling and other fishing activities on sea floor habitats.

"Why are we changing the way we fish, if we don't really understand even the basic linkages between our effects on habitat and the function of habitat for managed species?"

John Gauvin

Is the EFH mandate working to protect habitat?

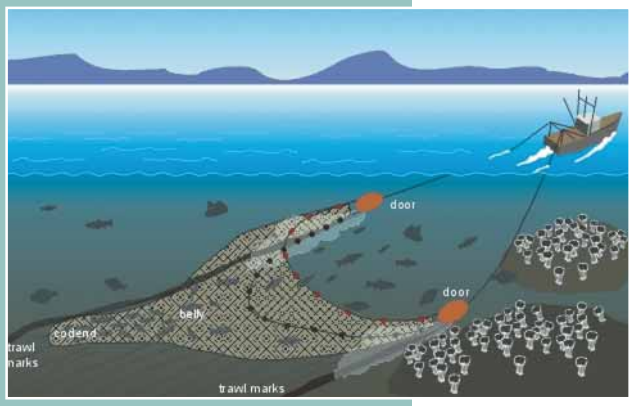


OAR/National Undersea Research Program

The EFH provisions of the MSA are working to protect fish habitat, but there is room for improvement. There still seems to be broad agreement among fishermen, conservationists, and others that healthy fisheries rely on healthy habitats, although many parties are concerned that implementation of the EFH mandate has not gone the way they anticipated. One concern is that the designations of EFH for most managed species are very large, and far broader than Congress may have anticipated when it defined the term EFH in 1996. Most Councils used a risk averse approach when identifying EFH. Given the limited available data and the huge variety of managed fish species, the mosaic of EFH designations covers virtually the entire Exclusive Economic Zone and nearshore waters, as well as fresh waters that support anadromous salmon. The question is how to focus habitat protection efforts on smaller areas if we know so little about where different habitat features are located, or how fish interact with their habitats. While it is easy to criticize the breadth of EFH designations, it is difficult to identify a viable

alternative when we have scarce information about which habitats contribute most to the productivity of commercially and recreationally important fish stocks.

Another concern, which is closely related, is how to prioritize conservation efforts for EFH. A number of environmental organizations charge that NOAA Fisheries and the Councils have not done enough to protect EFH from adverse effects caused by fishing activities, most notably bottom trawling. Some stakeholders also express concern that NOAA Fisheries is not able to use EFH more effectively to convince other agencies to restrict the impacts of non-fishing activities on fish habitat. At the same time, many in the fishing industry point to existing management measures that benefit fish habitat, and non-fishing industries emphasize that other laws already reduce the environmental impacts of actions that might otherwise threaten fish habitat. If EFH designations are so broad, clearly all of EFH cannot be put off limits to all human impacts. But if we are not able to pinpoint discrete habitats that are the key to sustaining fish stocks, how can we focus conservation priorities within these large EFH areas?

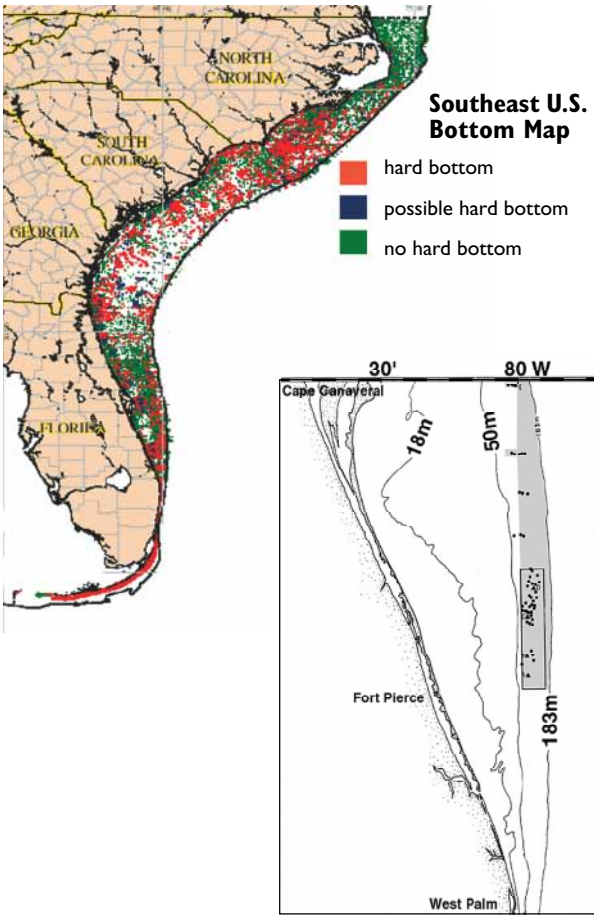


Oceana (after Christen, 1999)

NOAA Fisheries

One approach that many participants have identified is to use Habitat Areas of Particular Concern (HAPCs). NOAA Fisheries' regulations encourage Councils to identify HAPCs within EFH based on ecological importance, sensitivity, vulnerability, or rarity of the habitat. Several of the panelists pointed to HAPCs as a positive step — a useful tool to highlight specific areas of habitat that most people can agree are worth protecting. HAPCs can help to identify priority habitats for conservation. Nevertheless, as NOAA Fisheries pointed out in the preamble to its EFH regulations, healthy populations of fish require not only these relatively small habitats, but also other suitable areas that provide necessary habitat functions to support larger numbers of fish. Still, HAPCs could be used more widely and effectively than they have been to date, and may offer the potential for diverse stakeholders to reach agreement on appropriate management for at least some portion of the habitats that support the Nation's fisheries.

The EFH successes panelists cited from around the country all appear to have involved partnerships, whereby Councils created some kind of forum for different interests to work together, and participants agreed to start with achievable goals (i.e., "low hanging fruit") and then build on those successes. Likewise, where panelists cited failure to reach agreement on measures to protect EFH, there seems to have been an absence of such forums, or at least participants in the discussions were so focused on differences of opinion about broader issues that they were not able to capitalize on the issues where agreement might have been reached more easily. Successes in EFH conservation have included accomplishments such as agreeing on the habitat benefits of more reductions in fishing effort and improved fisheries enforcement, advancing discussions about the establishment of new HAPCs, and using EFH information to persuade the Corps of Engineers and other agencies to restrict coastal development projects that would have harmed fish habitat. Shortcomings in EFH conservation primarily have



SAFMC

(above) Grouper spawning aggregation in healthy *Oculina varicosa* habitat.

(left) Coral and hard/live bottom habitat off Southeast U.S. designated as EFH.

(detail) Oculina Bank HAPC.

Maps courtesy SEAMAP Bottom Mapping Project and Dr. Bill Cole, USFWS.

revolved around polarized positions: litigation or threats of litigation, perceived hidden agendas, and general distrust among important stakeholders. As with other aspects of marine fisheries management, the EFH mandate could probably be more effective if participants in the management process could find ways to focus more on their mutual interests, and not let their differences interfere with making progress on areas of common ground.

Can fishermen and environmentalists be more effective partners for habitat conservation?

Improving partnerships for the conservation of fish habitat will require fishermen and environmentalists to avoid taking extreme positions and instead work together to set and attain common goals. Importantly, all sides need to realize that habitat conservation is not a single large battle to be won or lost. The maturation of U.S. fishery management has brought habitat conservation squarely into the mix of issues that most stakeholders acknowledge as fundamental to sustainable fisheries. Like reducing overfishing and minimizing bycatch, protecting habitat is an ongoing process. As fisheries change and new information becomes available, the Councils and stakeholders will need to continue assessing how fishing affects habitat and how habitat alteration may affect fisheries.

"The designation of EFH can be and is an effective tool."

Bill Cole

"General policy statements and guidelines on how to address EFH and ecosystem-based management provides a better approach than direct regulations that tie our hands."

Earl Krygier

SAFMC

The panel discussion suggested several ways to improve coordination and communication to encourage habitat conservation:

- The fishing industry and the conservation community should view the EFH process as one that will improve over time as additional scientific information becomes available and as both sides grow more comfortable working together.

- Fishermen and environmentalists should do what they can to help NOAA Fisheries and the Councils gain more information about habitat functions and threats to habitat, because better information will enable management efforts to focus on the steps that will benefit future fisheries the most. Without being able to measure the benefits of actions intended to protect habitat, cost/benefit analyses will continue to emphasize economic costs to the industry, raising legitimate questions about whether it is practicable to impose large costs for uncertain future benefits.

- Stakeholders should maintain an open dialog and attempt to narrow their differences regarding habitat protection before a Council or NOAA Fisheries has to make key decisions. If a Council or the agency is faced with a dichotomous win/lose decision, one side inevitably will be very unhappy with the outcome.

- Participants in fishery management should not avoid dealing with potential habitat problems for which information gaps may exist, because if real conservation issues go unaddressed, deferring action may cause larger problems later, and unnecessary crisis-based management.

- Expanded use of HAPCs as a management tool offers the potential for fishermen and environmentalists to agree on protections for certain special habitats, even if the parties continue to debate how to handle management of larger EFH areas.

- The fishing industry and the conservation community should continue to work together to raise concern about threats to fish habitat from coastal development, pollution, and other non-fishing activities.

- When discussing habitat issues, fishermen and environmentalists should respect each other's views and work to build more trusting relations. Real progress on habitat conservation depends upon the willingness of participants to work together.

"Non-point source pollution in estuaries, nitrogen loading, is far more damaging to critical habitat."

Gary Caputi

"It should surprise nobody that every part of the ocean is important for some or multiple life history stages of important regulated species or their prey."

Doug Rader

Future Directions in Habitat Conservation

Habitat conservation in U.S. fishery management has come a very long way in the last decade. Although a variety of participants and observers have criticized the way in which Councils and NOAA Fisheries implement the EFH requirements of the MSA, significant progress has been made, and habitat issues are a much more prominent part of fishery management today than they have ever been before. Councils and NOAA Fisheries spend considerable time and effort evaluating habitat issues and assessing the consequences of their actions on fish habitat, much as they evaluate consequences for protected species or bycatch. More and more Councils can point to specific actions they have taken to protect habitat as part of their management program to build sustainable fisheries. Unquestionably, additional work needs to be done to improve our knowledge base about habitat, build stronger partnerships amongst stakeholders to facilitate habitat conservation, and refine the management approaches used to protect vulnerable habitat. The challenge is to build on progress the Councils and NOAA Fisheries have made, and to focus on ways to improve upon the successes achieved to date.

Habitat will be one of the key issues when Congress considers reauthorization of the MSA, presumably in 2005. Will Congress make significant changes to the way habitat is considered in fishery management, or will it leave the existing EFH provisions relatively intact? The answer may depend on how well the fishing industry, environmental groups, and other stakeholders can work together within the current regime to demonstrate that habitat problems are not intractable and can be addressed effectively through the Council process. If Congress perceives that the EFH provisions will lead to further litigation and uncertainty for the Nation's fisheries, substantial changes may be more likely. On the other hand, if Congress sees progress and signs that the EFH provisions can be workable, the existing framework may remain for the foreseeable future. Habitat protection for federally managed fish species is at a critical juncture, and developments in the coming months will be very influential in determining the policy direction that will guide the consideration of habitat in fishery management for years to come.

"When I started fishing, there were three billion people. There are six now. In another 30 years how many are we going to have?"

Richard Taylor

WPFMC

Informational display of the Western Pacific Fishery Management Council.

NOAA Fisheries

5. Protected Species Considerations

Moderator:
Dr. Douglas DeMaster
NOAA Fisheries

Rapporteur:
Bill Wilson
North Pacific Fishery Management Council

Participants:
Dr. Andy Read
Duke University

Larry Cotter
Aleutian Pribilof Islands Community Development Association

Eldon Greenberg
Garvey, Schubert & Barer

Thorn Smith
North Pacific Longline Association

Dan McKiernan
Massachusetts Division of Marine Fisheries

Laurie Allen
NOAA Fisheries

Eric Gilman
Blue Ocean Institute

Jim Cook
Pacific Ocean Producers

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Bill Wilson

The Regional Councils and NOAA Fisheries have implemented a wide variety of protection measures designed to minimize known or potential adverse effects of fishing activities on "protected resources." Protected resources are here defined as marine mammals, seabirds, sea turtles, or other organisms whose populations have declined, are listed as threatened or endangered or have otherwise been deemed to warrant special measures to protect them from human activities.

Many federal, state, territorial, and local laws and statutes regulate U.S. commercial fisheries, and some of these laws mandate special measures for protected resources. The MSA requires the Councils and NOAA Fisheries to manage fish populations under their jurisdiction so as to provide an optimum yield while not allowing overfishing on target or non-target populations. For all managed fisheries, the Endangered Species Act (ESA) specifies that, for endangered or threatened plant or animal species, the Councils and NOAA Fisheries are restricted from taking fishery management actions that may result in jeopardizing the continued existence of that species or may adversely impact its critical habitat. The Marine Mammal Protection Act (MMPA) sets limits on annual levels of marine mammal mortality incidental to commercial fishing in U.S. waters. The limit, once reached, calls for establishment of Take Reduction Teams, which are charged with developing solutions to reduce mortality within a specified time period (e.g., 1-2 years). Additionally, the MMPA makes it unlawful to "take" marine mammals unless specifically authorized under the statute (commercial fisheries have a special exemption to the MMPA take provisions and must comply with other regulations to minimize or document take). The term "take" is defined in the MMPA as to (or attempt to) harass, hunt, capture or kill a marine mammal. The MMPA also mandates that fisheries managers must implement a process of take reduction and must take steps to reduce incidental mortality and serious injury to marine mammals to insignificant levels approaching a zero mortality and serious injury rate.

These laws often have goals that appear to conflict with each other, occasionally creating an atmosphere of confusion and distrust among fishery stakeholders, consumers, managers, and the general public. Unfortunately this situation has often resulted in litigation to resolve uncertainty and conflict or to mediate opposing and strongly held viewpoints. One recurring appearance of conflict is between the MSA goal for optimum yield, and ESA and MMPA goals for protection of listed species (many of which are marine mammals and seabirds that inhabit, and forage in, the same oceanic areas targeted by commercial fishermen). Only rarely has Congress established a clear hierarchy of laws in the management of marine ecosystems. For example, certain mandates under the ESA take precedence over all other legal mandates (e.g., actions that jeopardize the continued existence of an ESA-listed species cannot be authorized by the federal government). Unfortunately, in some issues case law through litigation has been necessary for establishing Congressional intent in cases that involve mandates that appear to be inconsistent.

Where the fishery management process encounters the ESA, fishery managers (the "Action Agency") must enter into a Section 7 consultation with the "Consulting Agency," the agency with federally-mandated responsibility for the ESA-listed species likely to be affected by the action. The product of such consultations is a Biological Opinion that helps the Action Agency identify any endangered or threatened species that might be adversely impacted by a fishery management action. The Biological Opinion also describes how the proposed action may (or may not) jeopardize the continued existence of a listed species or may (or may not) adversely modify that species' critical habitat. Often, litigation occurs over the Biological Opinion and the proposed "Reasonable and Prudent Alternatives," frequently over their presentation of data that substantiate a determination of jeopardy and adverse modification. The determination of jeopardy and adverse modification is a judgement by the Consulting Agency. While the Consulting Agency's "opinion" may seem subjective to some, the determination is based on the available science and the jeopardy standard as described in legislation and regulations. Often uncertainty requires the Consulting Agency to be more precautionary, thus occasionally appearing to be subjective and open to interpretation. Some constituents suggest that additional guidelines be developed to assist NOAA Fisheries in determining under what circumstances to invoke jeopardy and/or adverse modification.

Inherent in the process of fishery management under the mandates of these various authorities (some of which have a legal framework with little or no flexibility) are such questions as how do the Councils and NOAA Fisheries manage for an optimum yield in a fishery which may have potential adverse impacts on a protected resource? And what is the optimal process for decisionmaking — the Council process, an agency-driven process, or is there another model? Therein lie the issue and the substance for the presentations by this panel.

"Are the management measures that we are putting in place to protect endangered and threatened species really justified in terms of the nature of the problem?"

ELDON GREENBERG

"When the alternative to litigation is to simply live with a decision that is not logical, has not been adequately explained, and has had a devastating economic effect on the community and on my members, then litigation becomes unfortunately a tool for change."

JIM COOK

Kim Rivera, NMFS Alaska Region

Short-tailed albatross.

"I have this recurring dream that if I don't save the short-tails, one time this sabertooth albatross is going to cast me into open deep water."

THORN SMITH

Working Together to Find Solutions

Seabirds in Alaska

Regional Councils have long struggled with how to mitigate the incidental take of seabirds in commercial longline fisheries. This issue captured the public's interest and threatened to force managers to dramatically reduce or close certain fisheries. But in some cases, industry itself took the lead in finding solutions. In the North Pacific, the freezer longliner fleet took the initiative to research potential solutions to the incidental take of seabirds. Seabirds are hooked primarily while fishing gear is being set and are dragged under water and drown as the gear sinks. Of particular concern was the potential for take of the endangered short-tailed albatross, of which only 900 existed in the world in 1995.

Using experience in seabird avoidance from fisheries in the Southern Ocean and the knowledge of Alaska longline fishermen, the fleet proposed a set of seabird avoidance regulations to the North Pacific Fishery Management Council. The Council recommended immediate implementation of the regulations. Subsequent cooperative research by industry and Washington Sea Grant revealed that paired streamer lines, properly deployed while setting baits, are highly effective. The Council recommended an amendment to the regulations that would require the use of this technique. Although the regulations have yet to be implemented, the freezer-longliner fleet, encouraged by a U.S. Fish and Wildlife Service (USFWS) program providing free streamer lines through the Pacific States Marine Fisheries Commission, has voluntarily adopted the technology. The result has been an 80% reduction in seabird incidental takes since 1998 (*Figure 1*). The industry continues its cooperative research with Washington Sea Grant, supported by the USFWS, the Council, and NOAA Fisheries.

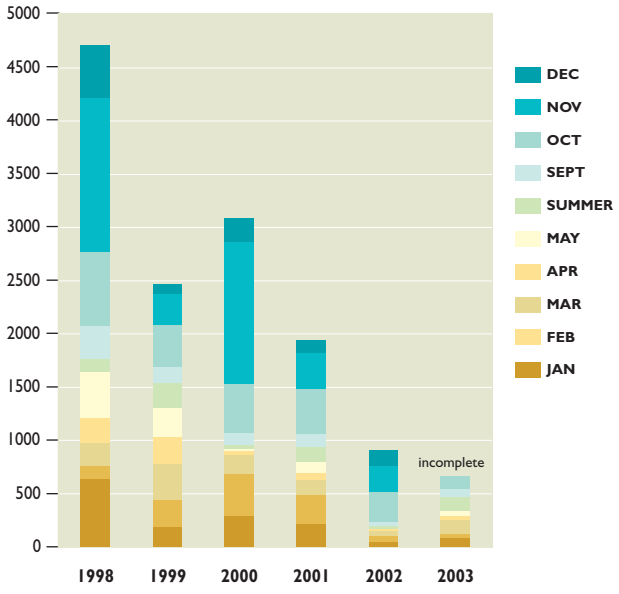


Figure 1

Freezer-Longliner Incidental Take of Seabirds in Bering Sea/Aleutian Islands and Gulf of Alaska

Chart data courtesy Thorn Smith.

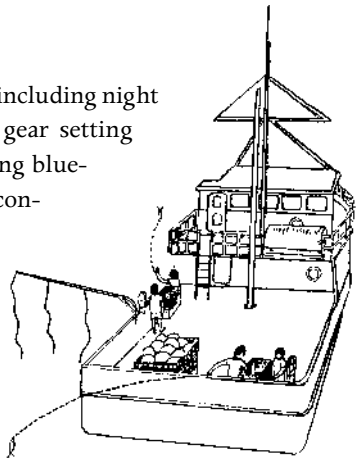
Seabirds in Hawaii

In the Hawaiian pelagic longline fisheries, a collaborative process involving the Western Pacific Fishery Management Council, NOAA Fisheries, the Blue Ocean Institute (an environmental group), the USFWS, Australian consultants, and industry together developed commercially viable practices to minimize takes of seabirds (particularly albatrosses and large petrels). The effort led to a solution that satisfied the performance tests and which may serve as a model for managing fishery interactions with sensitive species.

Nigel Brothers/ Blue Ocean Institute

Side setting and the use of bird curtains reduce bird mortality.

A variety of take avoidance measures was investigated, including night setting of longline gear, employing an underwater gear setting chute, setting gear from the side of the vessel, and using blue-dyed bait. Over a two-year period the project team conducted a performance assessment of seabird avoidance methods to determine effectiveness in avoiding seabirds, commercial viability, and enforceability.



Nigel Brothers/ Blue Ocean Institute

A method called side setting, which entails changing the typical location of gear setting from the stern to the side of the vessel, showed the highest promise. The method was effective at significantly reducing seabird interactions, was practical for use by the crew, and provided some unexpected operational efficiencies on board the vessel, all of which may provide incentives for a more broad application and voluntary compliance in many other fisheries. Such a bottom-up approach fosters a sense of industry ownership and shows great promise for effective and commercially viable future mitigation of seabird-fishery interactions.

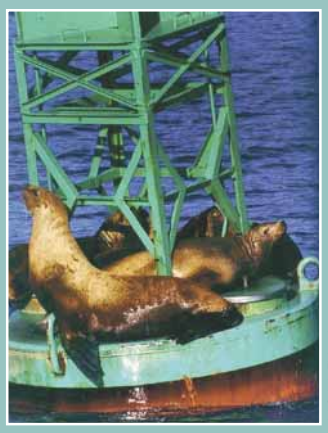
> ***"A bottom-up approach, that fosters a sense of industry ownership for effective and commercially viable seabird mitigation methods, is needed."***
>
> Eric Gilman

Sea Turtles in Hawaii

In the Hawaiian tuna and swordfish longline fisheries, the incidental take of sea turtles has resulted in fishery closures offshore of the Hawaiian Islands to avoid jeopardizing the continued existence of three species of sea turtles. This resulted in adverse economic impacts to fishermen and local communities. Fishermen believed that a lack of collaboration among industry and fishery managers led to these closures, and they sued NOAA for relief. The Court found that the Hawaii Longline Association should be considered formal "applicants" in the ESA process and that NOAA Fisheries failed to provide evidence in the administrative record to show how the proposed action was chosen by the action agency. Applicant status entitled the Hawaii Longline Association to certain procedural considerations during consultation. The Court invalidated the current Biological Opinion because of these procedural violations, meaning that a new Biological Opinion must be prepared by the agency. In this case, as in earlier cases with environmental organizations as plaintiffs, fishermen believed that litigation was an undesirable but necessary tool to effect change in the process of forging a solution to the incidental take of sea turtles in these longline fisheries.

WPFMC

Incidental take of sea turtles has resulted in fishery closures offshore of the Hawaiian Islands.

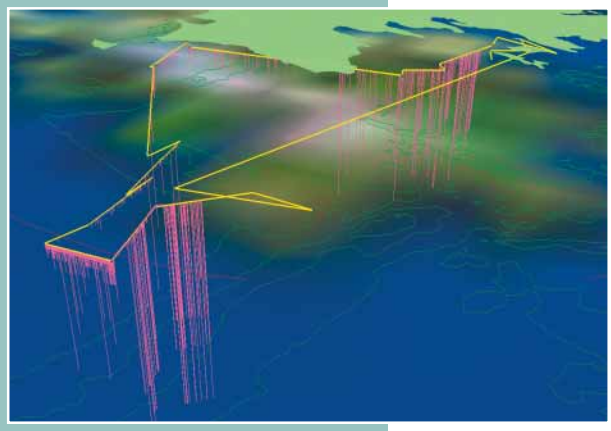


NOAA Fisheries

Steller Sea Lions

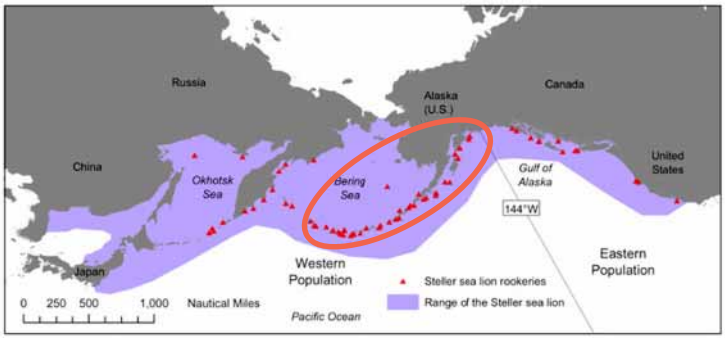
In Alaska, Steller sea lions have declined approximately 80 percent since the 1970s. In 1990 the Steller sea lion was listed as threatened under the ESA, but in 1997 the western population was listed as endangered, while the eastern population remained listed as threatened. In the late 1990s, NOAA Fisheries could not conclude that interactions between the western population of Steller sea lion and Alaska's pollock, Pacific cod, and Atka mackerel fisheries would not jeopardize the continued existence or adversely affect the critical habitat of the western Steller sea lion population. Reasonable and prudent measures were therefore imposed on commercial fishermen by NOAA Fisheries to mitigate potential adverse fishery interactions with the western population of Steller sea lion.

Subsequent regulations were developed in a more collaborative process with stakeholders. The North Pacific Council appointed a committee (comprised of representatives from NOAA Fisheries, the Council, environmental groups, and industry) to develop a suite of Steller sea lion protection measures that would be acceptable to all stakeholders and would be sufficient to remove the jeopardy and adverse modification finding. While the Council and NOAA Fisheries approved the committee's conservation measures, litigation as to whether these measures were adequately protective ensued. It is noteworthy that these conservation measures have withstood the litigation process, and now are the basis for regulations under which prosecution of these fisheries has continued while providing measures that will allow Steller sea lions to recover.



NOAA Fisheries

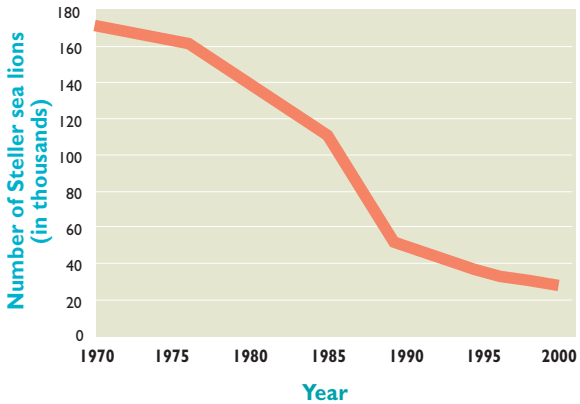
A 3-D representation of a 4.06 day foraging trip of an 11 month old male Steller sea lion during the month of May, 2000. 801 dives >4 meters occurred in 10, 6-hour periods. Mean dive depth was 22.77 meters and the maximum dive depth recorded was 152 meters.



Western Stock of Steller Sea Lions 1970-2000

The western stock of SSLs has declined more than 80% since the 1970s.

Source: NOAA Alaska Fisheries Science Center



"Our management system must be as sophisticated as our harvesting capabilities."

Larry Cotter

North Atlantic Right Whales

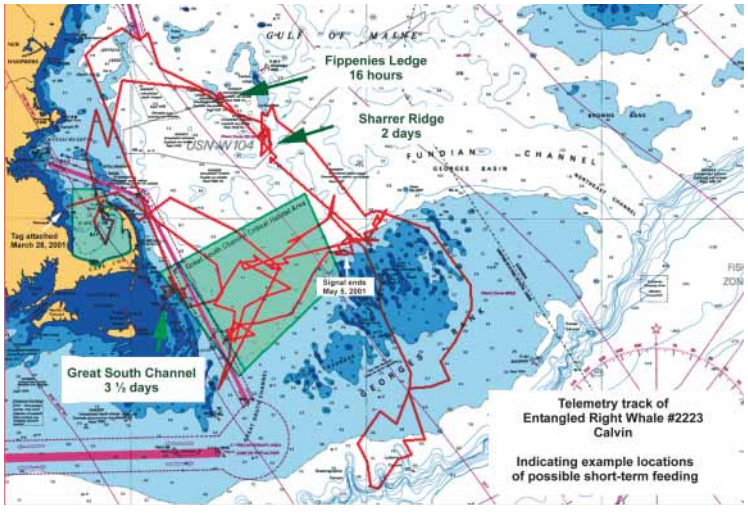
New England groundfish and lobster fisheries have been extensively litigated to impose fishing restrictions to protect the endangered North Atlantic right whale; only 300 to 350 of these whales currently exist. Initial protection efforts suggested by the Large Whale Take Reduction Team have included identification and protection of critical habitat areas, time and area fishery closures, and active gear disentanglement programs. But telemetry studies of North Atlantic right whale movement patterns have demonstrated that these whales make extensive use of areas outside designated critical habitat, reducing the effectiveness of fishery time/area closure management. Gear disentanglement efforts showed that most recovered gear was not identifiable to source, and researchers have concluded that modifying fishing gear to prevent contact with whales will be more effective than after-the-fact physical removal. In addition, vessel strikes of right whales occur from maritime activities other than fishing, necessitating whale avoidance programs in many maritime industries throughout the range of this species. The Take Reduction Team continues to struggle to find the right mix of measures that may allow this severely endangered whale population to recover.

NOAA Fisheries/Center for Coastal Studies

Team attempts to disentangle a whale.

"We need to do a better job of integrating the management of marine mammals into fisheries management."

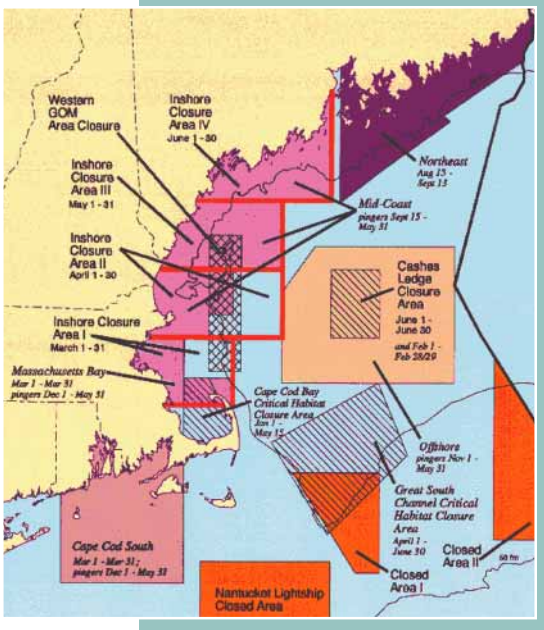
ANDY READ



NOAA Fisheries/Center for Coastal Studies

Telemetry track of entangled right whale indicating example locations of possible short-term feeding.

Chart shows closures under the Gulf of Maine component of the Harbor Porpoise Take Reduction Plan and closures under the Northeast Multispecies Fishery Management Plan.



Dr. Andy Read

Summary and Recommendations

Managers of commercial fisheries in the U.S. EEZ face distinct challenges in providing solutions to the legal, regulatory, technological, and economic aspects of Protected Resources management. Some of these challenges are specific to certain fisheries or are unique to a particular region, while others are programmatic in nature. The following recommendations were suggested by panelists during the discussion.

"I believe we can come up with better gears and better ways to protect right whales, but I don't believe we can meet the zero mortality rate goal or the zero PBR. It really is a fool's errand, inviting lawsuits that have really done little to enhance smart management of our fisheries, but have tied up a lot of folks in court."

Dan McKiernan

- Encourage development of regulatory changes that will minimize or remove, to the extent possible, the often-conflicting mandates under the ESA, the MMPA, and the MSA. This should include revisiting the process for listing species under the ESA or the MMPA, better defining when jeopardy and adverse modification is invoked under the ESA, providing improved guidelines for defining critical habitat for ESA-listed species, and revisiting the concept of the zero mortality rate goal. Each of these circumstances currently instills ambiguity, confusion, and litigation-susceptible components to the fishery management process.

- Identify and integrate Protected Resources issues early in the process of developing or amending fishery management plans or implementing other rulemaking. Improve communications and education of stakeholders and the public in the laws and statutes affecting fishery management, particularly the National Environmental Policy Act, the ESA, and the MMPA. Encourage an open and transparent process for Section 7 consultations and for preparing environmental assessments and impact statements including ample public participation and peer review.

- Ensure that hypotheses for mechanisms of how fishing activities impact a Protected Resource species are based on the best available scientific information and adequately precautionary. Open dialogue is necessary to educate and inform stakeholders on the scientific basis for proposed regulations, thus enabling stakeholders to gain confidence in the process.

WPFMC

The Western Pacific Council assisted in hosting four of the Multilateral High-Level Conferences in Honolulu, which led towards the establishment of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Central and Western Pacific Region.

- Encourage the U.S. to actively pursue international negotiations to encourage other nations to contribute to solutions that will protect migratory or shared resources, especially for those species under special protection measures mandated under U.S. laws. Currently, in some cases U.S. fishermen bear much of the burden for restricting fishing activities to protect some protected species that do not enjoy similar protection in adjacent countries.

- Place more emphasis on the Take Reduction Team process in developing management plans for ESA-listed or MMPA-protected resources that are impacted under U.S. fishery management regulations. Take Reduction Teams have successfully reduced cetacean take in several U.S. fisheries, and this open and collaborative process shows promise as an avenue for developing fishery management measures that are acceptable to stakeholders and the concerned federal or state entities. Specifically, this process may provide one of the few remaining opportunities for developing measures to protect the highly endangered North

Atlantic right whale since the impacts of many human activities other than commercial fisheries should be considered in the recovery efforts for this species.

- Minimize, as possible, adverse economic impacts of conservation measures on commercial and recreational fisheries. As necessary, educate constituent groups regarding the ESA mandate that the federal government can not authorize any actions that jeopardize the continued existence or adversely modify the critical habitat of an ESA-listed species.

- Conduct research and field trials of fishing gear designed or modified to reduce or eliminate entanglement of marine mammals, birds, and reptiles while meeting the operational needs of commercial fisheries.

Dr. Louis M. Herman, NOAA Fisheries

Humpback whales.

In summary, one of the largest challenges facing our Nation's fishery management process in the coming years will be to facilitate the recovery of ESA-listed species or MMPA-protected species, while permitting the prosecution of sustainable commercial fisheries in our EEZ. Managers will be required to be more innovative as they struggle with the complexities of regulating fisheries in a manner that ensures the protection and recovery of threatened and endangered species that may interact with these fisheries. Some may say that there have been no "failures" thus far. But fishery management has not always been successful in terms of adequately protecting certain non-target species. For example, the abundance of several protected species has declined in some areas, some species have been listed under the ESA, and other species are candidates for listing. In some parts of the Nation, fishery managers have closed or extensively reduced fisheries to protect certain protected species, and in many regions we have expanded government bureaucracies to deal with the recovery of marine mammals, seabirds, sea turtles, and other protected species. In recent years, our fisheries have come under court-imposed fishery management and other court-influenced fishing regimes. Litigation and judicial management of our Nation's fisheries is unappealing to all.

There is a clear need for continued and expanded collaboration among the Councils, NOAA Fisheries, fishermen, and environmental organizations in an open process that invites and then integrates public participation in the development of solutions to fishery conflicts with Protected Resource species. The Council process, although not perfect, largely has been an effective forum for definition, analysis, debate, and resolution of these conflicts. However, certain constituency groups feel disadvantaged by the Council process and this shortcoming needs to be addressed in the future. Further, there are some lingering extremely difficult problems related to commercial fisheries and protected resources (such as the continued entanglement of North Atlantic right whales). The future success of our Nation's fishery management process, towards reducing the effects of fishing on protected species, will require more sophisticated approaches and more innovative efforts on the part of all stakeholders.

"We need to take a more proactive role to tell people about what is in the recovery plans, what actions you can take, and what you need to avoid."

Laurie Allen

Florida Keys National Marine Sanctuary, NOAA Fisheries

6. Ecosystem Planning

Synopsis written by Mark Mitsuyasu and David Fluharty

Moderator:
Dr. David Fluharty
University of Washington

Rapporteur:
Mark Mitsuyasu
Western Pacific Fishery Management Council

Participants:
Dr. Andy Rosenberg
University of New Hampshire

Dr. Bonnie McCay
Rutgers University

Ken Hinman
National Coalition for Marine Conservation

Pat Livingston
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Donna Parker
Arctic Storm Management Group

Dr. Ed Houde
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Roger Pugliese
South Atlantic Fishery Management Council

Dr. Jeff Polovina
NOAA Fisheries

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Ecosystem-based management has been proposed as the new paradigm for fisheries management. Ecosystem-based fishery management aims at conserving the structure and function of marine ecosystems, in addition to conserving fishery resources. Several years ago, a NMFS Ecosystem Principles Advisory Panel (EPAP) prepared a report to Congress on how to apply ecosystem principles in fishery conservation and management. The EPAP described ecosystem-based management for marine fisheries as follows:

> "Ecosystem-based management can be an important complement to existing fisheries management approaches. When fishery managers understand the complex ecological and socioeconomic environments in which fish and fisheries exist, they may be able to anticipate the effects that fishery management will have on the ecosystem and the effects that ecosystem change will have on fisheries. A comprehensive ecosystem-based fisheries management approach would require managers to consider all interactions that a target fish stock has with predators, competitors, and prey species; the effects of weather and climate on fisheries biology and ecology; the complex interactions between fishes and their habitat; and the effects of fishing on fish stocks and their habitat."

Additionally, the EPAP developed a list of basic ecosystem principles and policies, and recommended that fisheries ecosystem plans be developed as a first step toward a full ecosystem approach. Components of the plan include food web models, habitat needs, estimates of total removals, an assessment of uncertainty and buffers, indices of ecosystem health and use, long-term monitoring plans, and an assessment of other elements. Ecosystem-based management policies reflect the overriding aspects of ecosystem principles associated with the limitations on extraction, uncertainty, and the role of humans within ecosystems.

Since the release of the EPAP report, further development of these concepts has occurred in practice, and more papers on this subject have been published in the

scientific literature. It is clear that fisheries management in the U.S. is slowly developing greater interest in using an ecosystem approach.

An ecosystem can be defined as populations and communities of interacting organisms and physical environment with characteristic trophic structure and material (energy) cycle. Ecosystems consist of complex interactions among their natural and human components, and our knowledge about these interactions is often limited.

Ecosystem-based management must be thought of in broad terms, not solely fisheries conservation. Consideration must be given to managing and understanding the impacts of human activities (fishing and non-fishing activities), and understanding the interactions among marine species and the physical environment. Ecosystem-based management of fisheries would include taking into account what occurs outside of the EEZ fishery management area, i.e., activities occurring within watersheds, coastal areas, and open ocean regions. Furthermore, goals for ecosystem-based management plans must be clearly articulated so that progress towards these goals can be evaluated. Ecosystem management must be adaptive and integrate more forms of knowledge to recognize and respond to uncertainty, contingencies and variability inherent in ecosystems. These are important considerations in developing an ecosystem-based management plan.

People are also part of the ecosystem and must be explicitly considered in the development of ecosystem-based fishery management plans. People outside of the scientific community have valuable contributions to ecosystem understanding and conservation planning. For example, coastal residents and resource users provide valuable understanding through traditional ecological knowledge and experience. An ecosystem-based management model may better incorporate this type of knowledge.

A comparison of the traditional fisheries management approach and an ecosystem-based approach is shown in the table below.

"It's 'ecosystem-based' because we're managing the human activities — not the ecosystem — and their potential impacts on species and resources."

ANDY ROSENBERG

"People are more than just sources of fishing mortality; they are participants, they are stakeholders, they are monitors, they are managers."

BONNIE MCCAY

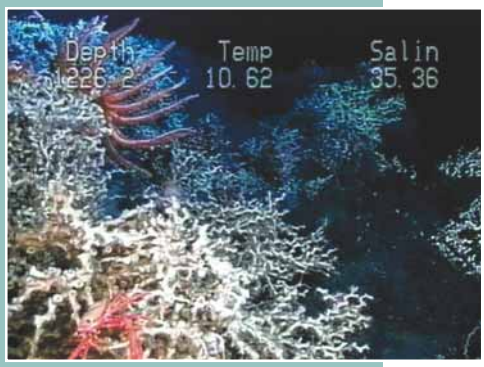
Matt Anderson

Traditional	Ecosystem-based
Utilitarian values.	Utilitarian & "land ethic" values.
Commodity production (MSY).	Humbler science, accepting uncertainty.
Single species models & management.	Multiple-species; habitat; interactions; discontinuities.
Deterministic scientific models.	Adaptive & bioregional management.
Top-down management; government and expert-based.	Bottom-up, collaborative.
Scientific control of data & analysis.	"Social" = active, engaged user groups & communities.
People represented by rates or amounts of resource use (fishing mortality), or as source of political interference.	Human use represented by variety of ecosystem services with multiple stakeholders represented in consensus-oriented management processes.

Implementing changes to fundamental broad-based management regimes will likely be completed over a long time frame. Suggestions were made as interim steps for initiating movement toward melding ecosystem-based management principles into fishery policies.

In 1999, the National Research Council (NRC) recommended immediate steps that could be taken to ensure sustainable fisheries through the implementation of an ecosystem-based approach to fisheries management. These actions, which could be taken management framework, are to:

- Adopt conservative harvest levels and set conservative catch limits;
- Adopt a precautionary approach to deal with uncertainty;
- Reduce excess fishing capacity and assign fishing rights;
- Establish Marine Protected Areas as a buffer for uncertainty;
- Include bycatch and discard in catch accounting;
- Institutionalize scientific and stakeholder review into a transparent decision making process;
- Conduct more research on structure and function of marine ecosystems; and
- Incorporate ecosystem-based goals into management decisions.



SAFMC

Cooperative mapping of deepwater habitat supports the ecosystem-based approach.

According to the U.S. Commission on Ocean Policy, fishery policy development and implementation regimes now in place could be supplemented by establishing a National Ocean Council that would function to: coordinate federal agency activities regarding oceans; implement and continuously improve and develop new policies as needs arise; guide federal agency reorganization or consolidation; and create a national program to assess the status of ecosystems to provide critical goods and services. A pilot program that would create Regional Ocean Councils would help to facilitate ecosystem-based management and work with the Regional Fishery Management Councils and tribal, state and local governments.

"There are compelling reasons to begin by protecting forage species abundance in order to serve conservation of predator populations."

Ken Hinman

The Panel discussed the challenges of moving from current management to ecosystem-based management. There will be need for additional funding for ecosystem research as well as funding for new management efforts. There needs to be commitment of funding and administrative support. Ecosystem-based management will raise jurisdictional issues (including international issues), so coordination among agencies, states, and countries will be required. A better understanding of multi-species interactions will be required, and appropriate reference points would need to be determined. It will be necessary to have objectives, criteria, thresholds and triggers for the ecosystem-based approach, with a well-defined process for implementation.

"The fishing industry in the North Pacific supports ecosystem-based management because it works."

Donna Parker

Some coordination at the national and regional levels currently exists, but more guidance and support will be needed to implement an ecosystem-based approach, while respecting regional differences and situations. However, some panel members expressed concern that additional layers of government (or reform of the

Council process) could be counter-productive to moving ahead with ecosystem-based management.

As ecosystem management becomes established, economic and social data must be collected, not just for the fishery but other coastal concerns, power, gas, etc. A major investment in developing the economic information base must be made if tradeoffs are to be considered. Overall, a strong integration of scientific information about the resource, and the economic and social values affected, is a prerequisite for moving in the direction of ecosystem-based fishery management.

There are numerous promising examples of how ecosystem-based management principles have been incorporated into traditional fishery management programs. Several of these examples were discussed by the panel, as described below.

North Pacific

Fishing industry representatives in the North Pacific are supportive of the ecosystem-based management approach because, in their experience, it ensures continued healthy resources. Fishers have the largest stake in the management effort and will continue to participate in constructive ways. For the North Pacific fishing industry, ecosystem-based management is a natural progression of past management activities and evolving requirements has led to ecosystem-type considerations, such as protection of essential fish habitat, and defining bycatch, gear and harvest restrictions. For example, conservative harvest limits are set and closely monitored by an industry-funded observer program. In addition, innovative measures such as the development of an annual ecosystem considerations report, and a cap on total removals from the ecosystem, are hallmarks of the ecosystem approach in the North Pacific.

Each year since 1995, the Alaska Fisheries Science Center staff, together with numerous contributions from other agencies, compiles and prepares an "Ecosystem Considerations" report to complement the annual groundfish stock assessments. The report provides information on ecosystem trend indicators, which were built around the North Pacific Council's ecosystem-based management goals (maintain biodiversity, habitats, and sustainability, with the understanding that humans are part of the ecosystem). The indicators are used to systematically assess ecosystem factors such as climate, predators, prey, and habitat that might affect a particular stock. The goal of the report is to assess the effects of groundfish fisheries on ecosystem and habitat, which could result in advice regarding changes in catch levels, species mix of the catch, discard amounts, time/space allocations of catch, and systems of closed areas.

"The ecosystem must be conserved to ensure sustainable fisheries."

ED HOUDE

"We are taking on the challenge to address ecosystem-based management from a very strong foundation of long-term proactive management and protection of resources and habitat in the South Atlantic region."

ROGER PUGLIESE

Dr. James Balsiger, NOAA Fisheries

In the North Pacific, industry-funded observers closely monitor harvest.

"We are hoping to use an indicator approach to tell us what's going on in various pulse points of the ecosystem, and also what are the outcomes of our management."

PAT LIVINGSTON

SAMFC

Chesapeake Bay

The Chesapeake Bay Program is working to develop a multi-species, ecosystem-based fishery management plan by 2005. The goal is to have the fishery management plan serve as an umbrella framework, that will support ecosystem-based fishery management approaches in the Chesapeake Bay region. The proposed plan recommends actions for implementation of management approaches for resident species in the Bay, as well as coastal species. The plan also recommends research to enhance knowledge of the ecosystem, and its fisheries, in support of long-term management objectives. Key plan recommendations are to:

- Adopt Boundaries for management area;
- Adopt Essential Fish Habitat regulations for the Bay;
- Recognize key predator-prey relationships;
- Develop ecosystem-level reference points;
- Assess the risks for management options;
- Set thresholds for total removals, including bycatch;
- Improve estimates of recreational catch;
- Consider co-management and involve stakeholders;
- Conduct fishery-independent surveys;
- Coordinate regional database management;
- Consider all user groups — determine patterns that promote optimum use of resources; and
- Address socio-economic issues, goals & objectives within ecosystem-based approach.

Striped bass management was raised as an example of how ecosystem-based management might differ from current management practices. In this case, consideration of predator-prey information may provide different perspectives on management options. The population of striped bass, a portion of which utilizes Chesapeake Bay, is currently at an all time high biomass level. Recruitment is also high due to successive years of cold freshwater runoff. Concerns have been raised regarding the management of Atlantic menhaden, a primary forage fish for striped bass, in Chesapeake Bay. Although there are no particular recommendations at this time to address concerns regarding menhaden harvests, the ecosystem-based plan under development will address predator/prey management issues.

South Atlantic

In the Southeast Region, a comprehensive Fishery Ecosystem Plan (FEP) is being developed that will include all available biological, social and economic information within existing FMPs. The FEP will also specify research and monitoring needed to fully address ecosystem-based management. Ultimately, the FEP will:

- Define ecosystem geographical boundaries including the characterization of its biological, chemical and physical dynamics;
- Assess ecological, human and institutional elements (agencies/organizations) of the ecosystem;
- Develop a conceptual model of the food web;
- Describe the habitat needs of different life history stages for all managed species;
- Calculate/characterize total removals — landings, discards and bycatch;

- Develop indices of ecosystem health;
- Specify long-term research and monitoring needs; and
- Develop appropriate management including, catch limits, gear regulations, zoning, etc.

The challenge to support ecosystem-based management in the South Atlantic Region includes the need to:

- Expand interagency collaboration at the decision-making levels;
- Adequately fund basic fishery research;
- Establish new and expand existing long-term monitoring programs;
- Fund completion of mapping and characterization of all essential habitats;
- Apply innovative technologies to characterize fishing patterns relative to habitat; and
- Provide resources to adequately define fishing communities.

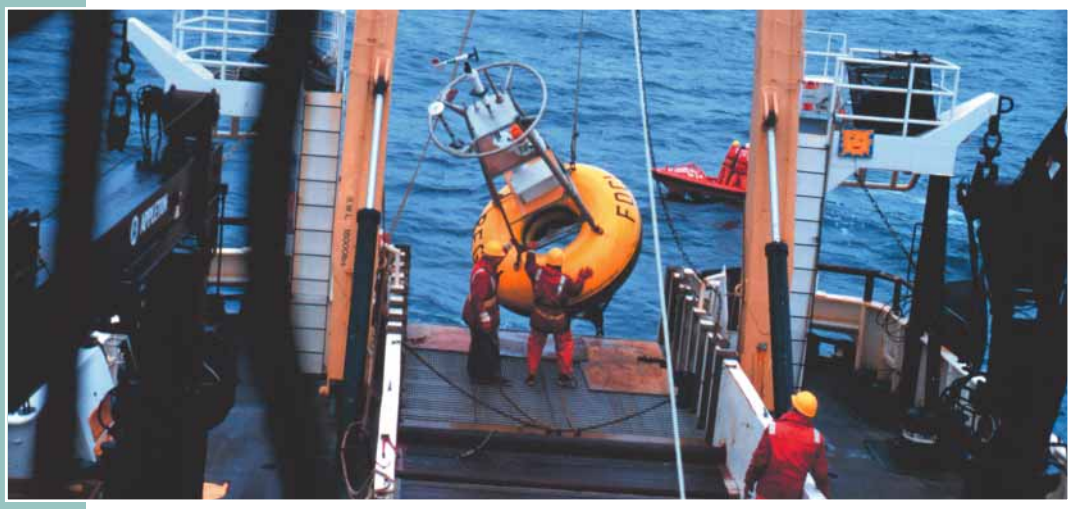
Western Pacific

In the Western Pacific Region, fishery dependent and independent information is being used to better understand ecosystems and fishery relationships to ecosystems. Fishery dependent data are obtained from the Hawaii-based longline fishery, a multi-species fishery. Through stomach content work, a generalized food web has been described. Additional information has been gained by studying non-target species associated with fishing fleets, including protected resources interactions. For example, tagging and monitoring of sea turtle species interacting with the longline fishery revealed that each sea turtle species has a different vertical distribution and migration pattern. This information resulted in modified fishing activities and identifying different relationships to the ecosystem.

"The ecosystem is complex, it has many dimensions, and the challenge is really to use a variety of approaches — the independent fisheries data, the fisheries data and the management — to better understand those dimensions and then to apply them to management."

JEFF POLOVINA

Dr. Jeff Polovina, WPFMC



NOAA Fisheries

7. Directions in Marine Research

Moderator:
Dr. Clarence Pautzke
North Pacific Research Board

Rapporteur:
Paul Dalzell
Western Pacific Fishery Management Council

Panel Participants:
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NOAA Fisheries

Dr. Jim Cowan
Coastal Fisheries Institute, Louisiana State University

Dr. William Fox
NOAA Fisheries

David Goethel
New England Fishery Management Council advisor

Heather McCarty
Pollock Conservation Cooperative Research Center

Dr. Earl Meredith
NOAA Fisheries

Jim Ruhle
Mid-Atlantic Fishery Management Council

Dr. John Sibert
University of Hawaii Pelagic Fisheries Research Program

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Paul Dalzell and Clarence Pautzke

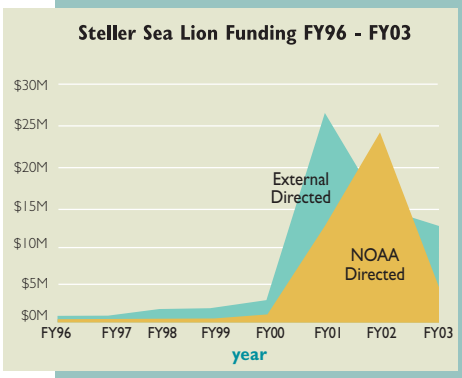
As Senator Ted Stevens of Alaska so clearly noted in opening this conference, management decisions must be based on sound science. Indeed, National Standard 2 of the Magnuson-Stevens Act (MSA) requires conservation and management measures to be based upon the best scientific information available. The difficult part, however, is determining exactly what constitutes sound science and best available information. This is no easy task when it comes to management decision-making and it will become even more difficult as resource managers move toward ecosystem-based management.

There can be a great difference between academic research and the types of applied research that ultimately are used to support public policy decisions, especially when severe economic costs may be involved in the outcome. Most academic scientists advance their careers by publishing in respected, peer-reviewed journals. This peer review is a closed, anonymous process that maintains the integrity of the scientific process, but also can be quite lengthy from the completion of the research to the date of publication.

In contrast, contemporary fisheries management often requires rapid-fire analyses of regulatory proposals and their impacts in the form of environmental assessments, environmental impact statements, and regulatory impact assessments, all subject to intense public scrutiny, debate, and challenge. Under these conditions, the scientists and analysts must strive to maintain the highest levels of quality of research and science, despite having to use partial data sets often characterized by high uncertainty. Maintaining this high level of quality research will require good scientists, a competent review process, and moreover, adequate funding for marine research. And because these analyses occur in a public policy arena, it also will require user group buy-in and cooperative research in order for stakeholders to have faith in the information and research, and ultimately consensus and compliance with regulations.

Of the three main sources of information for fisheries management decisions — research by federal and state agencies, cooperative programs between government agencies and fishermen, and research performed by academic intuitions — most panel presentations and discussion focused on the need for more cooperative research, citing examples from various regions around the U.S. Also noted was the need to recognize the validity of information from other sources. For example, Alaskan Natives and Pacific Islanders depend on the sea for sustenance and have built up a considerable body of knowledge through centuries of experience. This knowledge base, formally defined as traditional ecological knowledge or TEK, is more than just anecdotal information and should be incorporated into contemporary management.

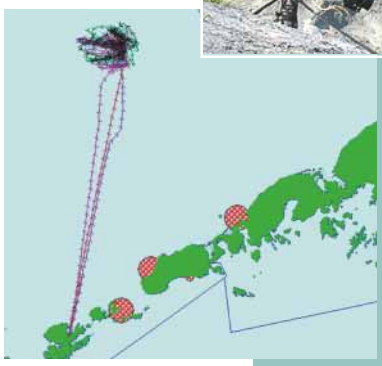
(opposite page) NOAA scientists service meteorological buoy in the Aleutian Islands.



In the North Pacific

Historical information can be an important data source. In Alaska, for example, there are records of sporadic research cruises during the eighteenth and nineteenth centuries. Events such as the collapse of fur seal population at the Pribilof Islands early in the twentieth century also stimulated additional research. The first systematic surveys of Alaskan marine resources were conducted by the Japanese and Russians following World War II. Major advances in measuring fish removals were made by deploying U.S. scientists on foreign vessels. Later the MSA required observers on foreign vessels fishing within the U.S. Exclusive Economic Zone around Alaska. This was funded by the foreign fishing concerns and ultimately led to the success of the domestic observer program on U.S. vessels fishing off Alaska. Over time, long-term fishery independent surveys have been conducted on various fish and marine life, *e.g.,* seals and sea lions. This type of research was aimed at explaining ecosystem linkages and answering such questions as why Steller sea lion populations have declined. Twenty years ago, 99% of research off Alaska was performed by the federal government. However, more recently, federal research funds to address such issues as the Steller sea lion decline, have increasingly been channeled through non-federal agencies and institutions.

NOAA Fisheries



NOAA Fisheries

(above)
Remote camera monitoring Steller sea lions on Chiswell Island, North Pacific.

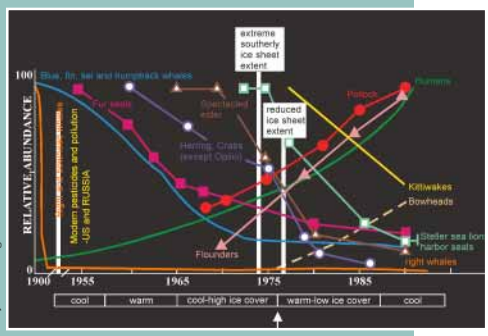
(left)
Computer display of a VMS tracking system, showing the movement of vessels fishing north of Dutch Harbor, Alaska.

In Alaska's history, there are numerous examples of productive collaborative research initiatives. Some resulted from fishing industries and communities funding their own research because of dissatisfaction with government fishery research programs. For example, in 1947 the Alaskan salmon industry was concerned about federal management of salmon, and in response, commercial salmon packers founded the University of Washington research program. This ultimately became the basis of the Alaska Department of Fish and Game and its management programs under statehood starting in 1959. Another example of fishing industry-sponsored research is the North Pacific Universities Marine Mammal Research Consortium (MMC) established by the Pacific Seafood Processors Association to research reasons for the Steller sea lion collapse. The MMC conducted research on nutrition, growth, health, and population dynamics of Steller sea lions and now works on other marine mammals.

The Pollock Conservation Cooperative Research Center, funded by pollock fisheries, provides a third example. Seven companies contribute $1.4 million to the

"Cooperative research will continue because the cost of not working together is more than the taxpayers, scientists, fishermen, environmentalists or the bureaucracy can afford."

DAVID GOETHAL



Dr. James Balsiger

North Pacific species population changes suggest regime shift.

"We are trying to shift from species specific research to try to understand the ecosystem context in which those species exist."

JIM BALSIGER

WPFMC

"We, the fishermen, are trying to work with the Science Center to provide them the input that we feel is critical for the future development of science."

JIM RUHLE

Center. It conducts an annual review of priorities, and has an advisory board composed of fishing industry and government representatives. There were three grant programs and the Center hoped to establish a faculty chair in ocean policy at the University of Alaska at Fairbanks. Research priorities included the effects of fishing on habitat, stock assessment models, salmon bycatch, pollock stock dynamics, northern fur seal sustainability, seabirds and fisheries. In addition, community development quota (CDQ) groups, which hold 10% of the pollock, halibut and crab quotas, also support research programs off Alaska, such as a halibut and blue king crab study near the Pribilof Islands, Bristol Bay salmon research, and Norton Sound salmon research and habitat restoration. CDQ groups also are part of the Marine Conservation Alliance, which supports research, e.g., a salmon excluder device for trawl nets. Future developments may include continued support of NMFS research, more participation by industry and communities, increased public education and outreach.

Western Pacific

Highly Migratory Species (HMS) research in the U.S. has waxed and waned over time; however, the inclusion of HMS in the MSA in 1992, the signing of the UN Straddling Stocks Agreement, together with the array of new high-tech tools and oceanographic data, all have stimulated a renaissance in HMS research. Some trends and priorities for the HMS research in the future are as follows:

- A greater role for councils in establishing research priorities for NOAA Fisheries;
- Multidisciplinary research programs (oceanography, economics, social science, biology) in support of ecosystem-based management;
- Increased international collaboration in research and fewer adversarial relationships;
- Research priorities will be set to address uncertainties in stock assessments;
- Increased application of biochemical techniques, e.g., egg and larval surveys;
- Conventional and electronic tagging for fishery independent stock assessments; and
- The training of young scientists.

The importance of sound scientific research on HMS species was illustrated with the example of a recent paper published in a high profile science journal, which claimed that 90% of large pelagic predators in the Pacific had been eliminated by fishing. This was in contrast to the results of reliable Pacific stock assessments which suggested that biomasses of large predatory HMS species have declined by only 5-40%, i.e., are above the levels required to support MSY. There was a sense that the scientific community has been stifled in debate over controversies such as these. Misleading statements made repeatedly by the environmental community increasingly become perceived to be true. The fishing industry cannot refute misleading statements, but academics and researchers can refute bad science.

A good example of HMS research is the University of Hawaii Pelagic Fisheries Research Program which has funded 75 projects in response to priorities set by a steering committee composed of representatives of the University of Hawaii, Western Pacific Fishery Management Council, and NOAA Fisheries. Research funding

levels for HMS, however, represent only a very small 0.5% of the $2 billion landed value of the resource. No significant increases in federal, industry or private foundation funding are envisaged, so prioritization of research activities will be critical. These shortfalls in research will impose costs in terms of the uncertainty inherent in fisheries science. Fisheries can be closed or fish stocks may be damaged by decisions based on uncertainty.

North Atlantic

While the North Pacific provides many good examples of industry working in collaboration with scientists in the development of stock assessments, the history of scientist-fishermen collaboration on the East Coast has been fraught with mistrust. A recent example is the controversy surrounding the trawl warp gear used by NMFS to conduct fishery independent surveys in New England. The fishery independent survey had a long history using the same fishing gear over many years. The survey then was expanded from being groundfish-only to a much broader list of species, including pelagic fishes. Fishermen felt that the survey results did not always match conditions on the fishing grounds. While NMFS has many excellent fishery scientists, problems with data collection led to East Coast fishermen mistrusting the science. For example, there were ongoing arguments between fishermen and the Northeast Fisheries Science Center about perceived low estimates of NMFS-independent surveys of scup, scallop, and surfclam. Fishermen believe that compliance with management measures will increase if they have confidence in stock assessment results. They believe that involvement of industry in data collection and survey design is necessary to rebuild confidence in stock assessments. Other potential sources of information include observer programs and collaborations between scientists and the fishing industry to design and test gear modifications. Funding for such endeavors could be garnered by allocating a fraction of the harvest for research support.

NMFS recognizes that involving fishermen in fishery research is of fundamental importance and is moving in that direction in New England. The NMFS Cooperative Research Partners Initiative has ten different funding components, including funds for anadromous fish research, Saltonstall-Kennedy funds, Inter-jurisdictional fisheries funds, and cooperative research grants. The objectives are to enhance data for management, expand and enhance communication among fishermen and managers, and to access the fishermen's knowledge base. The cooperative research program has funded over 30 projects, including tagging of 40,000 cod, an industry-based survey to enhance inshore fishery independent data, and developing an industry study fleet to provide real time catch-per-unit-effort data. The program has been testing various electronic devices to provide real-time fishery dependent information. It has also funded research to help integrate ship-to-shore data transfer to expedite research and biological sampling, conservation engineering to modify trawl gear, spatial-temporal availability studies, and habitat studies. Having fishermen involved expedites getting information into the management arena.

A second example of cooperative research in New England is the research consortium that Congress funded through Sea Grant. Its prime objective is to minimize differences between scientists and fishermen and to get timely answers for management questions. Scientists, fishermen, and environmental non-governmental organizations (NGOs) work together on volunteer committees to administer

"To address ecological questions, you have to have a comprehensive set of data and a long time series."

Bill Fox

Dr. Shelly Tallack, GOMRI

Tagging cod.

"Having fishermen involved in the process from the very beginning, all the way through to the review process, and expediting getting that information into the management arena, is very valuable and beneficial."

Earl Meredith

Dr. Earl Meredith, NOAA Fisheries

Fisherman and scientist work together during a cooperative trawl survey.

CR Environmental

Researchers deploy a Remoted Operated Vehicle (ROV) equipped with underwater video.

"There are many collaborative efforts in the North Pacific, partially funded and totally funded by the fishing industry."

HEATHER MCCARTY

Captain Robert A. Pawlowski, NOAA Corps

Researchers deploy a CTD rosette sampler off the NOAA ship *R/V Miller Freeman.*

"Investment in research now avoids costly consequences of uncertainty in the future."

JOHN SIBERT

consortium funds. Other objectives are to ensure that funding is not wasted, and that projects are conducted in a scientifically rigorous manner and with a high degree of cooperation between fishermen and scientists. Some of the prejudice that has built up between the two groups has dissipated as a result, and scientists and fishermen have made contacts outside their communities to whom they can bring concerns. To increase the chances of success, projects must follow the following guidelines: (1) project goals and objectives should be clear and not overly ambitious; (2) project accounting should be transparent and have good oversight; and (3) completed projects should be successfully integrated into management. The New England Fishery Management Council currently is finalizing a policy on the publication of results. The development of the research consortium is demonstrating that fishermen and scientists can conduct cooperative research successfully, and in the process, produce results that are more likely to be accepted by a wider spectrum of stakeholder groups.

Toward the Future

Ecosystem-based management will be a prominent feature of resource management in the future and current research endeavors will need to be up to the task. Even now, stock assessment methodologies are struggling to keep pace with the rigorous requirements of the Sustainable Fisheries Act (SFA) of 1996. The SFA led to revisions in the National Standard Guidelines and NMFS technical guidance, requiring managers to be more conservative and to take into account uncertainty in stock assessments. Fishery models now must respond to stricter legal requirements of interpreting the national standards and provide quantitative estimates of biological reference points associated with National Standard 1, such as maximum fishing mortality threshold and maximum stock size threshold, both designed to indicate risks associated with fishing mortality and stock size.

These new requirements may place unreasonable demands on current stock assessment models, especially considering the uncertainty involved in the data and methods employed. Considerable research will be needed to improve these models to be responsive to the more rigid control rules outlined in the technical guidelines. This also calls into question whether or not stock rebuilding programs can be justified based upon assessment models that are designed to make short term estimates of acceptable levels of exploitation. Uncertainty in model results, coupled with rigid interpretation of the likelihood of success of proposed management options based upon these results, leads to intense scrutiny of the models and increased tension between assessment scientists, advisory panels, fishery managers, NMFS and the Secretary of Commerce. A breakdown in communication and trust at any link in the above chain can and will debilitate the management process.

Moving to ecosystem-based management will require even more rigorous and expansive data, not just about fish stocks, but for other components of the ecosystem. One of the promising sources of such data will be the NOAA Ecological Oberving System (EOS), which is an integrated approach to managing marine ecosystems with the following elements:

- Public input;
- Performance indicators;
- Reference points;

- Functional valuation of habitat;
- Transformation and enhancement of surveys into observing systems; and
- Understanding the processes that control ecosystems.

The NOAA EOS includes data acquisition, modeling and analytical products, routine shipboard surveys, observers, and fishery independent surveys. Ecosystem-based management must recognize the dynamics of ecosystems, and will require long-term data sets to give fishery scientists and managers the ability to distinguish whether change results from regime shifts within the ocean environment or from the consequences of fishing. NOAA has long-term data sets extending over 50 years, e.g., the CalCOFI database for the West Coast, surveys in the Bering Sea and Gulf of Alaska, and trawl surveys in the mid-Atlantic, New England and the Gulf of Mexico. Such surveys need to be augmented, integrated and updated into a system to enhance our understanding of the fishery resources and the ecosystems in which they live. New developments for EOS include the Pacific Coast Observing System which will examine the Pacific marine ecosystem. This includes a new, extremely quiet, hydroacoustic research vessel, which cannot be easily detected by marine animals. NOAA also is designing underwater vehicles, and investing in biota as ocean explorers, e.g., sharks and seals that can be tagged to sample the marine environment.

Dr. James Balsiger, NOAA Fisheries

R/V Oscar Dyson launch ceremony.

Training the Next Generation of Scientists

A problem in academic institutions for conducting fishery research has been a significant culture shift in the past 10 years with the decline in funding budgets. The problem is that many institutions now are scoring faculties on their ability to attract external funding. Many institutions will not permit graduate students to be taken on unless full funding support for that student can be demonstrated. Consequently, professors have to give projects to students rather than students developing their own ideas and this could affect the quality of their science experience and ability to think creatively and independently.

"In some ways interpretation of the SFA has placed unrealistic demands on the data and models."

Jim Cowan

Fisheries and marine science education at the high school level also needs to be broadened. Students often want to go into biology for aesthetic reasons (e.g., to swim with whales and dolphins), rather than to conduct disciplined science. There is a need to get students out of the classroom and onto the water to provide more hands-on experiences. Additionally, scientists must be able to write papers and grants proposals, and must recognize that fisheries science is a multi-disciplinary profession. However, teaching institutions are not naturally multi-disciplinary in nature. In addition, it is not well appreciated that the seafood sector is a major economic activity in the United States, but no academic institution offers degrees in seafood business, and fishery education is not taught in schools.

Multi-disciplinary approaches need to be encouraged, and communication skill enhancement should also be included in student science training. Communication is an important issue, yet funding often is invested in data gathering and stock assessments, rather than on communications and how to teach communication skills to students. Not only must scientists be able to communicate their activities and findings to others, there may be a need for public relations experts to translate scientific jargon into plain English for the general public to understand.

NMFS Observer Program

Moderator:
Dr. Jack Tagart
Tagart Consulting

Rapporteur:
Jane DiCosimo
North Pacific Fishery Management Council

Participants:
Jack Dunnigan
NOAA Fisheries

Bobbi Walker
Gulf of Mexico Fishery Management Council

Dr. Donald McIsaac
Pacific Fishery Management Council

Dr. Samuel Pooley
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Dr. Steve Murawski
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Paul MacGregor
Mundt MacGregor

Dr. Benny Gallaway
LGL Ecological Research Associates

Mark Powell
The Ocean Conservancy

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

8. Policy Perspectives on Bycatch

Synopsis written by Jack Tagart

For those interested in the proper conservation and management of our national fisheries, bycatch has been a prominent concern. In 1994, Alverson et al. presented a landmark summary of world-wide estimates of fishery bycatch, citing 27 million mt of discarded fishery catch, with the highest contributions from shrimp trawl fisheries. Bycatch was perceived as a threat to the conservation of our national fisheries resources. By 1996, national concerns expressed in the Sustainable Fisheries Act resulted in the addition of a new national standard (Standard 9) to the Magnuson-Stevens Act (MSA) requiring regional Fishery Management Councils to amend their Fishery Management Plans (FMPs) to limit bycatch:

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

The MSA defines bycatch as "...fish which are harvested in a fishery, but which are not sold or kept for personal use." The MSA further defines fish as "...finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds." This definition regulates the manner in which bycatch is counted for all federal FMPs, but it does not completely address the type of catches regarded as bycatch by many constituents. One missing catch classification of concern are directed fisheries catches of non-target fish, retained for eventual sale; these catches are often referred to as incidental catch. There are some who believe fisheries should be forced to become as targeted as possible to avoid incidental catch as well as bycatch. Another category of concern is catches of marine invertebrates, mammals, reptiles and birds. However, marine mammals and birds are clearly not part of the definition in the

MSA. Nevertheless, numerous regional programs have been developed to address these forms of catch.

Fisheries managers look at the catch of managed species as a controllable source of mortality imposed on fished populations. Precise knowledge of catch is a key component of fisheries management. At its core, bycatch is a specific subset of catch, and when properly monitored and counted, it has no greater or lesser import than other monitored forms of catch. Furthermore, the disposition of the catch is of no immediate consequence to the health and well-being of the fished population, i.e., it makes no difference to the fished population whether catch is targeted or bycatch, or once caught whether it is retained or discarded. Distinctions such as targeted versus bycatch and retained versus discarded catch arise from the debate on social/political objectives for policies regulating our national fisheries.

From a national policy perspective, there are some inconsistencies in the structure of our policy guidelines. For example, from the NOAA Fisheries publication of the MSA National Standard Guidelines:

> "The Magnuson-Stevens Act specifically exempted fish caught in highly migratory species tag-and-release programs in the Atlantic from being considered bycatch. This exemption was not extended in the SFA to Pacific highly migratory programs. Therefore, fish tagged and released in highly migratory species tag-and-release programs in the Pacific are considered bycatch."

In the Western Pacific region, this policy limits the opportunity to develop recreational billfish catch-and-release fisheries, because they would be regarded as exacerbating rather than minimizing bycatch. Yet in other recreational fisheries, catch and release is encouraged, and in some cases regulated. For example, the coho salmon fishery off Washington and Oregon is regulated to catch and retain marked hatchery produced salmon and release unmarked wild origin fish. The released fish in this fishery are regarded as regulatory discards and counted as bycatch.

What steps have been taken to limit bycatch?

Bycatch has been described as the "solid waste" problem of fisheries, and fisheries managers can learn from how society has addressed this problem. Land-based solid waste has been substantially reduced in the past decade, through a combination of incentives, tax policy, regulation, public education, and economics. The three R's of solid waste policy (reduce, reuse, and recycle) can be reworked to the three A's of bycatch reduction: account, avoid, and apply. Managers need to account for bycatch for stock assessment purposes and to understand ecosystem effects. Bycatch can be avoided though changes in gear technology and fishing patterns. Finally, given proper incentives, fishermen can utilize (i.e., apply) bycatch by developing new markets for some species, marketing low volumes, donating to foodbanks, or other uses.

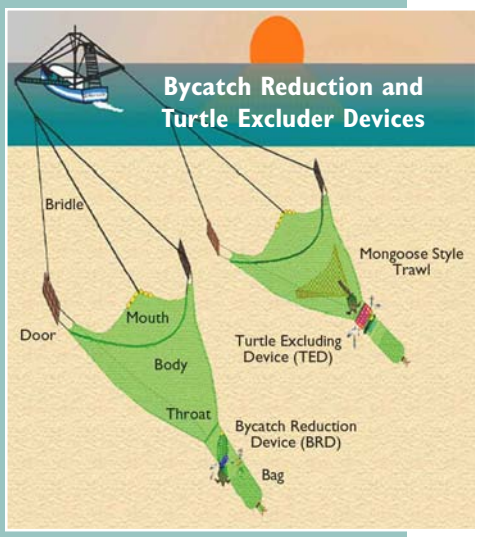
"Why is it that we think that bycatch is somehow different from killing a fish that you are going to eat, or killing a fish that you are not going to eat? I'm never quite clear about that."

Sam Pooley

Dr. Benny Gallaway, LGL Ecological Research Association

"The last of the A's is to apply discards. And that is basically to make use of what you can't avoid."

Steve Murawski



SAFMC

"For the Gulf of Mexico, I would have to say that the introduction of bycatch reduction devices in the shrimp trawl fishery was the greatest thing we did in our region to reduce bycatch."

Bobbi Walker

To date, bycatch reduction effort for most U.S. fisheries has focused on avoiding the bycatch in the first place. Many different measures have been utilized by fishery managers to reduce bycatch. These measures include the development of technological improvements in fishing gear to enhance target species catch while limiting bycatch, the creation of time/area closures to limit access to fishing grounds (that would otherwise result in a high incidence of non-directed fish catch), the imposition of specific catch quotas or caps for non-target species, the creation of incentive programs to limit bycatch, and rationalization of the fisheries (through IFQs or cooperatives) to lower overall fishing effort and consequently limit bycatch.

Examples of fishing gear innovations to limit bycatch include raised footropes in the Gulf of Mexico shrimp trawl fishery and the north Atlantic whiting fishery, and the development of turtle excluder devices (TEDs) in the shrimp fisheries of the Gulf of Mexico and South Atlantic. In New England, bycatch of target species was greatly reduced when minimum mesh size requirements were reconciled with minimum fish sizes, so that catches now consist of almost exclusively legal sized fish. Bycatch reduction devices (BRDs) to lower finfish bycatch have been mandated in the Gulf of Mexico and North Atlantic shrimp trawl fisheries and various excluders are under study or in use in the North Pacific groundfish fisheries to limit bycatch of skates, halibut and salmon. Seabird avoidance devices have been implemented in the North Pacific and Western Pacific to limit incidental take of diving marine birds in longline fisheries.

Certain gear types are mandated to lower fishery bycatch. Pelagic trawl gear is required in the Bering Sea pollock fishery and the west coast rockfish fishery. Drift gillnets are prohibited in the South Atlantic (for Spanish mackerel) and in the Western Pacific. Trawls, gillnets and entanglement nets are prohibited in the South Atlantic snapper/grouper fishery.

Time/area closures are also used to limit the incidental catch of non-target species. In the Pacific Fishery Management Council region, an array of bathymetrically defined opened and closed areas was imposed to limit rockfish bycatch. In the South Atlantic, a similar strategy is used in the longline fishery to reduce the incidence of snapper/grouper bycatch. In the North Pacific, both permanent year-round and seasonal time/area closures are employed in the groundfish fishery to limit crab, salmon and herring bycatch.

Hard bycatch limits, or caps, are another method used to provide incentives to fishers to avoid discards and prohibited species. In the North Pacific, limits are placed on designated "prohibited species," which include salmon, halibut, crab and herring. These limits typically represent less than 1% of the prohibited species estimated population size. Targeted groundfish fisheries are constrained to fish within the cap and once a cap is reached directed groundfish fishing is closed.

Incentive programs to discourage high bycatch fisheries have also been implemented but with variable success. The North Pacific Council imposed a vessel incentive program (VIP) to penalize vessels with high bycatch rates and reward

those with low bycatch rates. The program ultimately succumbed to problems associated with enforcement of the individual vessel catch constraints. The Pacific Council has provided incentives to lower rockfish bycatch through the issuance of exempted fishing permits in the targeted arrowtooth flounder fishery. These permits require full-time on-board observers to monitor the bycatch rates of participating vessels.

Adoption of fishery management practices that substantially reduce or eliminate the race for fish, such as implementation of IFQ programs, have had a significant influence in increasing utilization of targeted fish catches and lowering unnecessary discards. In the Bering Sea pollock fishery, the implementation of the American Fisheries Act, and the authorization of the formation of voluntary fishery cooperatives, has resulted in a fishery with a slower pace and greater utilization of marketable fish products taken in the catch. It has also had the benefit of an industry sponsored initiative employing a private contractor to monitor bycatch in real-time thus allowing fishing cooperative participants to move their fishing operations to avoid bycatch.

NMFS Observer Program

Trawler in the Bering Sea encounters heavy seas.

What are the necessary elements of a successful bycatch minimization program?

Successful bycatch management requires (1) accurate monitoring and reporting of all components of the catch, (2) incentives for bycatch reduction and avoidance, (3) tools to facilitate bycatch reduction and avoidance, and (4) a regulatory regime that assures the fishery opportunity to capture the total allowable harvest of targeted species. If we reduce bycatch without harvesting the allowable catch, we aren't successful.

Effective catch monitoring is the cornerstone of any fisheries management plan. Total catch accounting should be the mantra of our national fisheries policy. Accomplishing this objective requires both shore-based and at-sea monitoring of fisheries catches. Shore-based monitoring programs have been staples of state and federal fisheries management for years. At-sea monitoring has a long history in some fisheries and is a much more recent practice in others. NOAA Fisheries in cooperation with states has implemented more than a dozen at-sea observer programs. Some account for a large fraction of the landed catch while others barely scratch the surface.

In the national debate on bycatch, there is no clear definition of success. Without a clear definition of success, there is no metric to determine whether or not we have achieved the outcomes sought. Stipulations in the MSA to minimize bycatch "to the extent practicable" leave an ambiguous target for fisheries managers. Since the intent of Congress was not to eliminate fisheries as a means to comply with this National Standard, how do we know when we have imposed sufficient constraints to meet the practicability test?

"With regard to practicability, in fishery management you really cannot get to zero on bycatch."

Don McIsaac

"Given the success in reducing bycatch in this fishery, has it been reduced to the extent practicable?"

Benny Gallaway

OAR/NURP

Juvenile cod caught in a gill net.

Although NOAA Fisheries is adapting a national strategy to address bycatch reduction, there will come a time when we reach a point of diminishing returns. It is impossible to get to zero bycatch. Even in a fishery as targeted and selective as the swordfish harpoon fishery, there is bycatch because some harpooned fish get away. Recognizing that zero bycatch is not achievable will mark a significant milestone in fisheries management policy, because it then places a demand on us to define a point that reflects the practicable solutions to bycatch management.

If we know how to reduce bycatch, why haven't we been more successful already?

Although the concept of monitoring the total catch in a fishery is easy to grasp, in practice it is difficult and expensive to accomplish. One reason we have not had greater success in bycatch monitoring is a lack of financial resources to place observers in strategic positions so that we can reliably and accurately estimate the total catch. The North Pacific groundfish fishery utilizes an observer program that is industry funded; annual cost to the fishing industry is more than 11 million dollars. In order for the industry to afford such a program, the fisheries first have to be profitable. One of the paradoxes of current fisheries management is that, in the past, many fisheries were allowed to expand to the point of unprofitability, thereby dramatically constraining options for improved catch monitoring in the process.

"There are some failures that have been going on in the last decade that we really need to learn from, because I don't think we ever want to repeat some of these failures."

Mark Powell

There are also serious logistical constraints to at-sea monitoring of fisheries catch. Many fishing vessels are barely large enough to carry their crew, let alone a government mandated observer. Concerns for safety of the crew and observer limit the size of vessels that can support an at-sea observer. Technological advances in remote sensing and/or video monitoring are just beginning to provide alternatives to the placement of at-sea observers.

"We have done a lot in fisheries to deal with bycatch, and we have done it for a lot more than just the last year and a half."

Jack Dunnigan

Creating incentives for bycatch reduction typically implies generating an opportunity for fisherman to gain access to harvestable resources otherwise unavailable to them. These types of opportunities require some form of set-aside of the harvestable resource, either a specific portion of total allowable harvest quota or access to reserved fishing areas. The access to quota may be derived by simply extending the number of fishing days for eligible fishermen or through direct allocation of quota to individual vessels or fishing cooperatives. Assuring the reward for bycatch reduction is realized by the fishermen that earn it usually requires that the fishery be rationalized in one form or another. The social/political pressures to maintain fisheries where there are no limits on individual vessels have been intense. Where "rights-based" fisheries have developed, bycatch has been reduced.

Progress has been made in the design of fishing gear to limit bycatch. Tools that generate the incentive to reduce bycatch are also available. Individual vessel or fishing cooperative bycatch allowances are an example of tools that could be invoked to lower bycatch. Management has to guard against hard-wiring solutions that provoke perverse outcomes. Inflexible time and area management is an example of a solution that can have perverse results. Providing Councils with greater authority to framework some regulatory solutions could improve the overall management.

In summary, bycatch reduction is a process. There is no magic bullet to achieve this goal. The problems associated with bycatch vary by region, as do the solutions. Fishery management councils have been and are continuing to make progress on this front.

Reference:
Alverson, D.L., M.H. Freeberg, S.A. Murawski, and J.G. Pope. 1994. A global assessment of fisheries bycatch and discard. FAO Fisheries Technical Paper 339. 233p.

"The key elements to successful management of bycatch are first of all reliable monitoring; second, reliable accounting for the bycatch mortality; third, providing incentives to fishermen to make sure that they can fish in a responsible way and keep bycatch at the lowest rate possible; and lastly, you've got to give them the tools with which to accomplish those goals."

PAUL MACGREGOR

Alaska Fisheries Science Center, Marine Observer Program

A National Marine Fisheries Service observer takes measurements of a codend aboard a trawler in the Bering Sea.

NOAA Fisheries

9. Technology, Data and Information in Bycatch Management

Moderator:
Galen Tromble
NOAA Fisheries

Rapporteur:
Lori Steele
New England Fishery Management Council

Participants:
Dr. Craig Rose
NOAA Fisheries

Karl Haflinger
Sea State, Inc.

Paul Dalzell
Western Pacific Fishery Management Council

Bob Zales II
National Association of Charterboat Operators

Dr. John Watson
NOAA Fisheries

Dr. Kathy Castro
Rhode Island Sea Grant

Dr. Chris Glass
Manomet Center for Conservation Sciences

Mike Cahall
Atlantic Coastal Cooperative Statistics Program

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

Synopsis written by Lori Steele

Bycatch is defined in the Magnuson-Stevens Act as fish that are harvested in a fishery but are not sold or kept for personal use, and includes economic discards and regulatory discards. This definition does not include fish that are released alive under a recreational catch-and-release fishery management program. National Standard 9 of the MSA requires that conservation and management measures, to the extent practicable, minimize bycatch and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch.

Minimizing bycatch and bycatch mortality in the Nation's fisheries is difficult and often complex, with problems that may be unique to each fishery, and therefore must be addressed on a case-by-case basis. Addressing bycatch entails: (1) developing gear technology to reduce bycatch and bycatch mortality, or to avoid bycatch altogether, (2) improving technology and information requirements to accurately quantify the nature and composition of bycatch, and (3) utilizing information and technology to further reduce bycatch, improve communication and feedback loops with the fishing industry, and enhance education about bycatch reduction techniques.

Although there is not a single solution to bycatch problems across all fisheries, many "tools" are available to scientists and fishermen for reducing bycatch. These tools include time/area closures to avoid high bycatch rates, development of new markets, improving survival of discards, and development of more selective gear to reduce capture of unmarketable or unwanted fish. Temporal/areal avoidance of undesirable species is one approach to bycatch reduction, but it relies on the ability to accurately know where overlaps exist between target and non-target species, which can be highly variable. Utilizing unintended catch by developing new markets or uses for the product can also minimize bycatch by converting discards to landings. Methods to improve the survival of discarded fish can be effective, but only for more robust fish species. Utilizing selective fishing methods and improving the selectivity of existing

fishing methods may also further minimize bycatch while providing the industry with maximum flexibility in their day-to-day operations. Depending on the specific situation, a combination of tools may be necessary to achieve effective results.

Understanding the nature and extent of a bycatch problem is the first and most important step to developing a successful solution. Once a solid understanding of the problem is achieved, possible tools to address it can be identified. The tools can then be tested through cooperative research with the fishing industry to find the most appropriate solution. It is important to revisit bycatch reduction devices, once implemented, to ensure their effectiveness over time as fishery conditions continue to change. Efforts should be made to avoid duplication, especially with limited resources available. In addition, a list should be compiled of problems for which tools do not yet exist; looking for places to explore further will ensure that this important research continues to be successful in the future.

Dr. Earl Meredith

Communication between fishermen and scientists is essential for effective bycatch management.

Cooperative research and the ability to work with the fishing industry to find solutions are critical elements of bycatch management and minimization. For a good idea to evolve into a successful bycatch management solution, the fishing industry should be active participants in every aspect of the research: planning, development, evaluation, and ultimately, implementation. Successful cooperative research aimed at reducing bycatch requires several necessary elements:

- A commitment from managers is necessary to ensure that successful experimentation can transfer into long-term management solutions.
- Industry acceptance of new technologies may require financial or other incentives (for example, the ability to fish in an area closed to less selective gear).
- Regulations implementing new technologies should be flexible and relatively easy to modify so that new gear requirements, especially those that are complicated and/or highly technical, can be adopted successfully by the industry.
- A commitment from enforcement personnel is necessary to ensure compliance throughout the fishing industry.
- Successful development and acceptance of gear technologies require effective communication and cooperation between users, fishery researchers, and regulators.

Scientists have an important role in developing gear technology to minimize bycatch and bycatch mortality. Most related research is conducted in cooperation with the fishing industry and fosters relationships between the industry and scientists, especially when a successful experiment translates into an effective management measure. Scientific participation is a valuable component of cooperative efforts to develop selective fishing methods.

"Often we talk about there being a bycatch and a discard problem without truly understanding the nature and the extent of the problem."

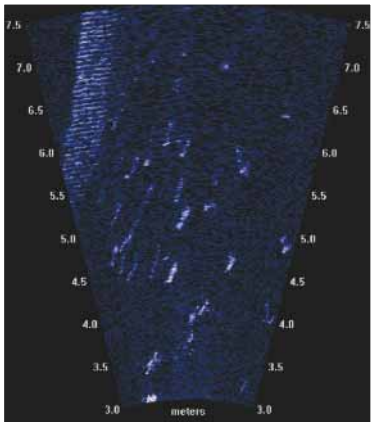
CHRIS GLASS

"In terms of quantifying bycatch, I think for us there is no substitute for observers."

PAUL DALZELL

Dr. Craig Rose, NOAA Fisheries

Dr. Craig Rose, NOAA Fisheries



Dr. Craig Rose, NOAA Fisheries

Scientists deploy high resolution sonar.

"Selective fishing methods do provide a solution for many bycatch problems, particularly in combination with other tools."

Craig Rose

"If the technology which you've developed results in increased cost or loss of revenue, it will likely be resisted by the users."

John Watson

Scientists can contribute "observation technology" such as video cameras to observe fish behavior in the field, high-resolution sonar equipment, and environmental sensors to account for changes in light or temperature. The reactions of fish to various gear designs may allow researchers to find differential behaviors that can be exploited to achieve species separation. Scientists can also perform "objective performance experiments" to quantitatively document the success of gear technologies for other scientists, fishermen, and fisheries managers. This includes developing a sound experimental design, utilizing scientifically-accepted sampling techniques, and conducting quantitative statistical analysis.

Communication and cooperation are the most critical elements to ensure the long-term success of bycatch reduction technologies. Stakeholder input (managers, researchers, fishermen, environmentalists, general public) must be utilized in all stages of cooperative research and bycatch management. Effective communication can also lead to wider acceptance of new technologies throughout the fishing industry, which ultimately improves compliance, increases trust between fishermen and scientists, and helps to change attitudes and foster a "culture of acceptance." Approaches being developed to improve communication and cooperation include:

Annual Bycatch Forum This forum is an annual opportunity to bring all interested stakeholders together to discuss bycatch issues and develop priorities and action items for the upcoming year (legal, monitoring, management, research, etc.).

Gear Conservation Network Websites and workshops can provide access to information for all stakeholders and a forum for information exchange throughout the world. This method is one way to maximize the limited number of available resources through information and resource sharing.

Educational Series (videos, written documents) Distribution of educational information can inform the public about the complexities associated with bycatch issues, and is an opportunity to share information about successful research.

Cooperative Research By strengthening and expanding efforts, we can find solutions to bycatch problems in cooperation with the fishing industry.

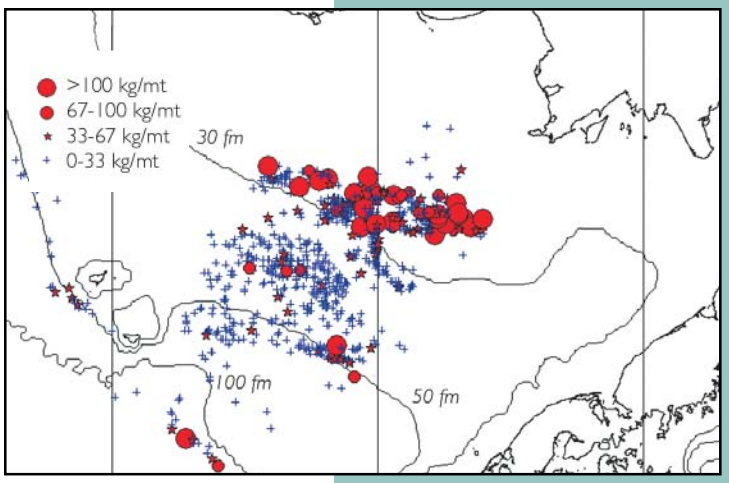
Improving Bycatch Data in Commercial and Recreational Fisheries

The collection and dissemination of accurate, comprehensive information about the nature and composition of bycatch in commercial and recreational fisheries is another critical element of successful management. The Atlantic Coastal Cooperative Statistics Program (ACCSP) is an example of a state and federal partnership to improve fishery data. ACCSP was created in 1995 to implement and conduct fisheries-dependent data collection and integrate the data into a central repository. At this time, ACCSP is focused primarily on the commercial data collection module to improve comprehensive data collection. As part of the bycatch data collection module, ACCSP's Bycatch Prioritization Committee determines priorities for funding and sampling through the program, creating a mechanism to rationally examine all fisheries and identify priorities based on a methodical approach. While the bycatch data collection module is not fully implemented yet, standards have been developed, and efforts are underway to ensure that this module will be implemented in the near future through the ongoing ACCSP project.

Observer coverage in commercial fisheries is a fundamental element for ensuring the collection of accurate and comprehensive bycatch data. Observers are able to collect real-time data regarding the nature and composition of catch and bycatch on commercial fishing trips. They can provide information that is helpful to characterize the condition of bycatch as well. However, ensuring an adequate level of observer coverage in many fisheries is difficult, especially those in which many smaller vessels participate. In the Western Pacific region, managers and scientists are exploring other ways to obtain bycatch data for smaller fishing vessels, including electronic observation (infrared imaging on the underside of vessels), "pursuit vessels" (observer vessels that follow smaller fishing vessels), and methods to better calibrate commercial logbook data with observer data across fisheries. In general, the accuracy of data on discards as recorded on commercial logbooks appears to be proportional to the economic value of the discarded species.

"The goal of ACCSP is to have comprehensive data. For a single commercial trip, we could have the trip record, multiple dealer records, an at-sea observer record, and the biological sample record — all tied to the same trip, all in the same database, all collected to the same standards."

Mike Cahall



Karl Haflinger, Sea State, Inc.

Halibut bycatch rates in the Bering Sea yellowfin sole fishery, 1999-2002, week 34.

An industry program to use spatial analysis and rapid dissemination of data collected by observers on commercial vessels has led to effective methods for minimizing bycatch in some fisheries on the west coast. In the Alaska region, large commercial vessels are required to carry an observer onboard for every fishing trip and to report observer data electronically. NOAA Fisheries receives real-time data from these observers regarding the spatial distribution of non-target species in the area, and this information is available to the industry through a secure website. A consultant to the industry, authorized to access and disseminate information from their vessels, transmits bycatch hot-spot information to other vessels fishing in the area. Vessels use this information to relocate their operations to areas with lower concentrations of non-target species. This has been an effective approach for reducing king crab bycatch in the rock sole fishery, allowing the rock sole fishery to remain open for a longer period of time. In the Bering Sea

"It doesn't really do us any good to know that bycatch has started somewhere if we can't send the boat somewhere else."

Karl Haflinger

pollock fishery, which has been rationalized and is managed through cooperatives, area closures are implemented by the cooperatives so that salmon bycatch can be minimized. Cooperatives are provided with a "Dirty 20 List" that identifies the vessels with the highest bycatch rates in the fishery. This allows participants in the fishery to effectively manage themselves and provides incentives for individual vessels in the fishery to minimize bycatch.

While recreational catch-and-release fisheries have made progress in minimizing bycatch and bycatch mortality (circle hooks, barbless hooks, education on proper release techniques), accurately documenting the nature and extent of recreational bycatch continues to be difficult. The Marine Recreational Fisheries Statistics Survey (MRFSS) attempts to document recreational bycatch (discarded, dead fish) through dockside interviewing and random phone surveys, both of which occur after the completion of the fishing trip(s). To estimate recreational bycatch, MRFSS relies on the recollection of the recreational anglers who are interviewed, and while many can recall the composition of the fish they kept, most cannot accurately recall as much about the fish they discarded.

NOAA Fisheries

Recreational catch-and-release fisheries have made progress in minimizing bycatch and bycatch mortality.

Over time, increasing demands for more accurate and comprehensive recreational catch information may have overextended the MRFSS survey, and the MRFSS data are often utilized in ways that may not be appropriate given the original intent of the survey to provide general information about trends in recreational fisheries. Recreational fisheries are socially and economically important, generating billions of dollars in revenues for many businesses throughout the coastal U.S. As a result, a new system for collecting accurate recreational catch and bycatch information may be important to ensure the long-term health of this sector of the fishing industry.

"Regulatory discards are a major part of recreational fisheries, and demand timely and accurate accounting in order to achieve good assessments to provide information on the status of our fishery resources and to properly manage our fisheries."

Bob Zales

Observations From the Field — Successful Bycatch Management Through Technology

In the Southeast Region, three successful experiments have translated into effective bycatch reduction technologies: (1) turtle excluder devices (TEDs) in the shrimp fishery *(Figure 1),* (2) finfish excluder devices in the shrimp fishery, and (3) sea turtle mitigation approaches in the pelagic longline fishery. Through cooperative research with the fishing industry, scientists were able to develop techniques to address bycatch that were ultimately adopted by fisheries managers and have significantly reduced bycatch problems in these fisheries.

In the Western Pacific region, many solutions to seabird bycatch in longline fisheries have been explored, and some of the most successful approaches have been implemented. Initial research indicated that night setting, blue-dyed bait, and weighted hooks set with a line shooter were the most effective methods for minimizing seabird incidental take. Recent research has focused on "setting chutes" and "side setting." Side setting (longline gear that is set off the side, rather than the stern of the vessel) appears to be an effective approach to reducing seabird incidental take as well. Fishermen are already converting their operations to side setting methods.

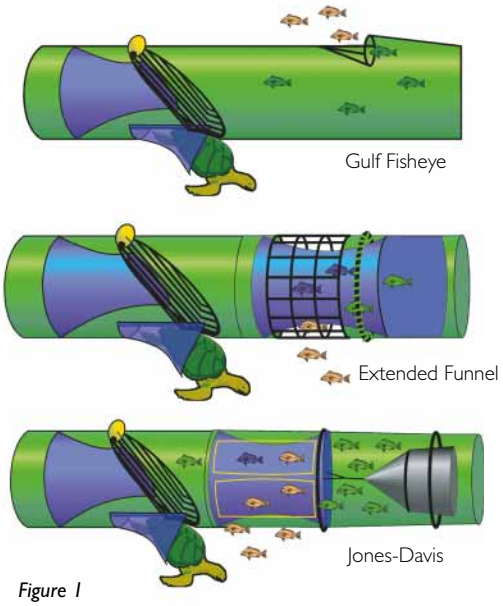


Figure 1

The Evolution of Turtle Excluder Devices (TEDs) and Finfish Excluder Devices in the Gulf of Mexico Shrimp Fishery.

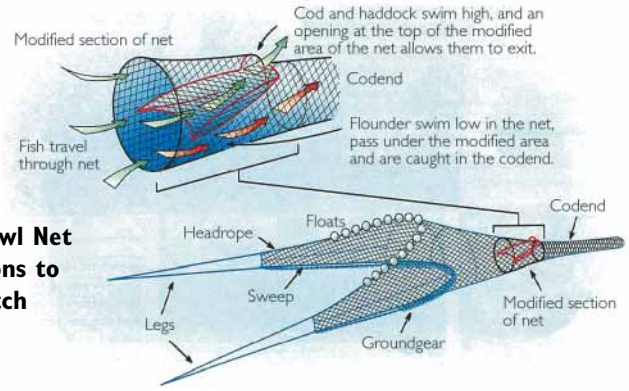
NOAA Fisheries

Diver riding a shrimp net watches a turtle escape through the excluder device.

Many successful approaches to bycatch minimization have been implemented throughout the Northeast Region. The Nordmore Grate eliminates bycatch of large finfish in the Gulf of Maine shrimp fishery. Acoustic pingers on gillnets have minimized interactions with marine mammals. The raised footrope trawl eliminates flatfish bycatch and significantly reduces roundfish bycatch in small mesh (whiting) fisheries throughout the region, and a sweepless net is currently being tested in these fisheries. These and other bycatch minimization measures (escape windows in trawls, escape vents in lobster traps, composite mesh codends, etc.) are changing attitudes and behavior throughout the region. The fishing industry in New England appears to be more interested now in catching smaller quantities of a higher-quality product that is not compromised by interactions with non-target species. As a result, significant progress is being made to reduce bycatch and discards thoughout the region.

"The fact that progress has been made in bycatch reduction is a very important point and shouldn't be minimized. But more work needs to be done."

KATHY CASTRO



Anatomy of a Trawl Net with Modifications to Reduce Bycatch

Diagram courtesy Dr. Earl Meredith

NOAA Fisheries

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MARGARET SPRING
U.S. Senate Commerce, Science and Transportation Committee

DAVE WHALEY
U.S. House Resources Committee

The following is a synopsis of the panel presentations and discussions, and does not necessarily represent the views of individual panelists.

10. Future Directions in Fisheries Policy

SYNOPSIS WRITTEN BY DAVID WITHERELL

Fishermen, conservationists, and managers agree that the overall goal of fisheries management is to provide wise stewardship of valuable and renewable marine resources, in order to provide food and other services for today and in the future. It is imperative that progress toward this goal be periodically evaluated, as we ask ourselves "How can we modify our Nation's fisheries policies to provide for a sustainable food supply, a healthy economy, recreational opportunities, and maintain viable marine ecosystems?"

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the governing law for managing fisheries in the U.S. Under this law, decisions on how to manage fisheries are made at a regional level by stakeholders through the eight regional fishery management councils. It is a democratic system of governance, with representation from all user groups and the general public. Council deliberations are made in public, using the best available scientific information, and final decisions are subject to approval by the Secretary of Commerce. The MSA is flexible in that it has been amended several times to reflect changing national policy. Most recently, in 1996, the Sustainable Fisheries Act amended the MSA by adding new requirements to rebuild depleted fish stocks, provide additional protection to fish habitat, reduce bycatch, consider fishing communities, and other required provisions.

The fisheries management system in the U.S. has been under scrutiny in recent years, partly as a result of heightened public interest and concern regarding the depleted status of some marine resources. In 2000, the U.S. Commission on Ocean Policy was appointed by the President to make recommendations to the President and Congress for a coordinated and comprehensive national ocean policy. Their report will address a broad range of ocean policy issues, from the stewardship of marine resources and pollution prevention to improving marine science, commerce, and transportation.

The preliminary recommendations of the U.S. Commission as they pertain to fisheries management include: broadening the representation on the Councils, requiring high-caliber scientific and statistical committees, requiring adherence to scientific guidance, support for cooperative fishery research and the use of individual fishing quotas (IFQs) as a management tool, and a transition to ecosystem-based management. The report is due to be available for public comment in early 2004. Another evaluation of ocean policy was initiated by the Pew Oceans Commission, which was established by the Pew Charitable Trusts. In June 2003, the Pew Oceans Commission made several recommendations relative to ocean policy and fisheries management. Included in the list of recommendations were the establishment of a new national oceans agency and oceans ecosystem councils. The Pew Oceans Commission also recommended that the MSA be amended to redefine the principle objective of fisheries policy to be protection of marine ecosystems, and other changes to the fishery management process.

Both Commissions have recommended changes that appear to lessen the role of the existing regional Councils in fisheries management, and these recommendations were discussed by the panel. Changes to the representation on the Councils have been recommended because some people perceive a conflict of interest by Council members who deliberate and vote on issues that may affect their particular fishery. Certainly, the membership composition of the Councils could be modified to reflect a broader range of interests. However, in proposing these changes, it should be recognized that the MSA was designed to have knowledgeable stakeholders participate directly in the development of fishery management plans through the Council system. The U.S. Commission on Ocean Policy also recommended mandatory adherence to scientific advice, or "separating science and management," particularly with regard to establishing annual catch limits. This recommendation was designed to address a perception that in some regions, Council members appear to place short-term economic interests above long-term conservation goals, and not heed the advice of their own scientific and statistical committees. Discussion of this recommendation by the panel revealed that Councils do not ignore their scientific advice. On the contrary, the Councils agreed that scientific advice was critical to successful management and should be an integral part of the Council process rather than a separate, independent entity. With the exception of determining annual catch limits for some species, virtually all other regulatory changes involve both conservation and allocation issues that may not be separable.

Fisheries management is complex, and simple solutions to problems are rare. Management involves biological, social, and economic information; budget constraints; agency cooperation; legal requirements; politics; and competing public perspectives. Adding to this complexity are the requirements of numerous other federal statutes with which the Councils must comply with the National Environmental Policy Act, the Administrative Procedures Act, the Regulatory Flexibility Act,

"The problems associated with bycatch and the solutions to these problems are as diverse as the fisheries themselves. To solve these problems, we need to continue to work together, whether we are fishers, managers, environmentalists, researchers or educators."

David Cupka

"I think it's important to listen to those that criticize our system, and listen carefully to their suggestions on how we should change to make it better. However, being a javelin catcher is a lot more difficult than being a javelin thrower."

Phil Anderson

"Without a doubt, U.S. fisheries management policies and plans are making substantial progress. But by no means is it time to celebrate. Many successes are fragile, and improvements are needed. But it is also important to recognize our accomplishments, share our errors, and address our future challenges."

Paul Howard

NMFS Observer Program

Trawler in the Bering Sea.

"One of the things that we must remember is why is there is a commercial fishery. It's because we have to feed a nation."

Virdin Brown

"The difference between anecdotal data and empirical data is just this: Empirical data has some body with some letters behind their name writing it down. Otherwise, it's really the same thing."

Robert Shipp

"We need to make the most of the tools that we have, make the most of the system of governance that we have, make the tough decisions that are going to make the difference, and move ahead."

Rebecca Lent

the Data Quality Act, the Marine Mammal Protection Act, and the Endangered Species Act, just to name a few. Due to these requirements, analytical documents tend to be very large (>1,000 pages) and difficult for the public to understand, and changes to fishery management regulations can take years to complete and implement. In addition, the complexities of the laws and regulations create a fertile ground for the proliferation of lawsuits, which adversely impact our national programs in fisheries management. Lawsuits impede effective public participation, tax valuable resources (time, people and money), and often slow progress. Streamlining is needed to be more efficient. One way to do this would be to implement new legislation that recognizes the many redundancies among laws and requirements (notably between NEPA and MSA).

A key component to sustainable fisheries in the future is capacity reduction. Capacity in many U.S. fisheries vastly exceeds what is necessary to harvest and process the optimum yield. The root cause of overcapacity is the open-access history of most fisheries, exacerbated by subsidized financing, improving technology, and a race for fish. Capacity of the fisheries must be matched with sustainable harvest amounts. Rights-based management, such as individual fishing quotas or cooperatives, is arguably the most promising way to achieve that match.

Fisheries management can be greatly improved with better scientific information and expanded data collection. In some cases, even the most basic biological data on fish stocks, as well as economic data on the fisheries, are lacking. Fishery data must be collected to improve stock assessments and to provide managers with catch and bycatch information for effective management. Automated data collection and speedy access to data will improve efficiencies for scientific investigations and use by managers. Vessel monitoring systems (VMS) allow for improved enforcement and safety. To better understand the effects of fisheries on ecosystems, more and better data need to be collected on predator-prey interactions, the relationship of fish and their habitat, the effects of fisheries on habitat, as well as basic physical environmental data.

Involvement of stakeholders, through cooperative research, has many potential benefits, and these programs should be expanded. In some regions, fishermen have not fully trusted the science, and this has inhibited effective management. To address this problem, scientific transparency and collaboration, coupled with better education and outreach, is required. For example, cooperative research that includes fishermen working with scientists will be critical to developing new gear technology to minimize bycatch. Collaboration and understanding cuts both ways; fishermen need to "buy into" the science, and scientists need to listen to fishermen who have much to offer in the way of direct observation and experience.

Adequate conservation of many fish stocks and other marine resources cannot be fully achieved without international cooperation. Fish move freely between the U.S. and international waters, which creates potentially serious conservation problems for those fish stocks that depend on foreign waters for a particular life stage (e.g., Caribbean queen conch). It also creates problems for marine resources that are subject to fishing mortality in international waters by foreign fleets (e.g., turtle bycatch in Pacific swordfish longline fisheries outside of the U.S. EEZ). Simply regulating the fisheries in U.S. waters alone cannot solve these problems. To address this issue, the U.S. must promote fishery conservation at the international level.

Similarly, the goal of healthy oceans cannot be achieved by simply regulating fishing activities. Other human activities — some occurring far inland — can also affect our oceans. For example, as cited in the Pew Oceans Commission report, a recent National Academy of Sciences study estimated that the amount of oil running off our streets and driveways, and ultimately flowing into the oceans, is equal to an *Exxon Valdez* oil spill (about 10.9 million gallons) every eight months. Pollution due to oil run-off, sewer and storm drain run-off, and other sources is a serious and alarming long-term threat to the health of our oceans. Councils and NOAA Fisheries should take an active role in addressing the problems caused by non-point source pollution.

To address these major challenges, the Councils and NOAA Fisheries should begin to design and implement ecosystem-based management approaches to management of fisheries and oceans in their regions. The Council regions appear to be appropriate ecosystem units, and some of the Councils are actively drafting ecosystem-based plans for their fisheries. The Councils and NOAA Fisheries must come to agreement on exactly what is "ecosystem-based management," and how to implement this approach. It is likely that ecosystem-based management requirements will be added, in some form or other, as part of the upcoming MSA reauthorization, and the Councils are ready and willing to work with NOAA Fisheries to explore ecosystem-based management plans as an approach to fishery management.

Many panel members concluded that overall, the MSA is not in need of a major overhaul. Since implementation of the Act in 1976, fishery management has evolved to meet new challenges, and many lessons have been learned. More recently, the Councils have made substantial progress on the requirements of the Sustainable Fisheries Act. The outlook for the Nation's fisheries is very positive; fewer stocks are being overfished, depleted stocks are rebuilding, and bycatch is being reduced. Yet additional effort is required to address remaining challenges; for example, a number of fish stocks continue to be subject to overfishing or remain in depleted status. In addition, the issues of bycatch and habitat degradation must be

"The litigation has really gotten our attention. It has resulted in a lot of funding going to NEPA compliance, to increased stock assessments, and to cooperative research. Litigation issues have really strained the budgetary and analytical capacity of the agency."

MARGARET SPRING

"I've been amazed at what a great piece of legislation the Magnuson Act is. One of the things that the Act did was create the Council system. That was incredibly innovative. Decisions are made by stakeholders who have an involvement in the decisions It's done in a transparent and public process, so everybody has a say."

DAVE WHALEY

Kirk Gillis, NOAA Fisheries

SAFMC

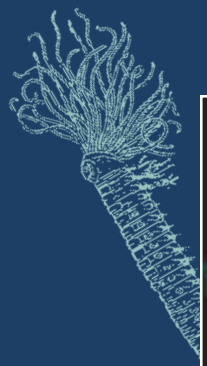
addressed. The current management system must respond aggressively to these challenges. Failure to respond appropriately on any single issue by any of the eight Councils will be viewed by those opposed to the continuation of the MSA as reason to reject the entire system. Each Council must work to be responsive to all of these important issues. In the end, the U.S. Congress and the President will have to decide what path is most appropriate for the management of fisheries in U.S. waters. However, as a diverse constituency, we should all commit ourselves to healthy fisheries in a healthy ocean.

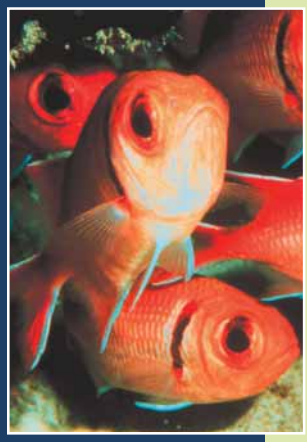
"Everywhere we held hearings, we heard the same theme: A bottom-up approach was much better than a top-down one. Public participation and decision-making on a local and regional level was much more preferred than policies and decisions arising out of Washington."

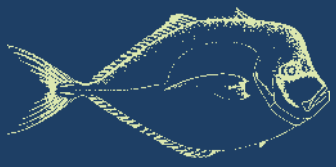
ED RASMUSON

"My message to you is to stop overfishing on overfished stocks. I think that one thing alone would demonstrate to the conservation community that there is real ability of the Councils to manage their work."

ROGER RUFE







Section IV.

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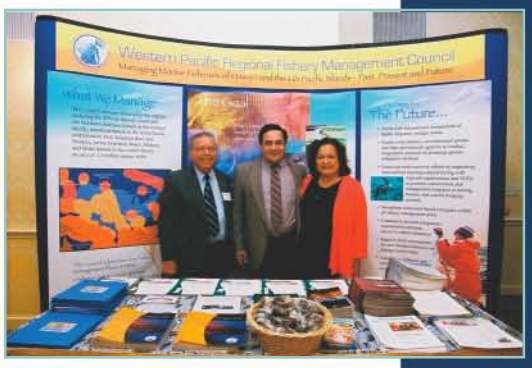

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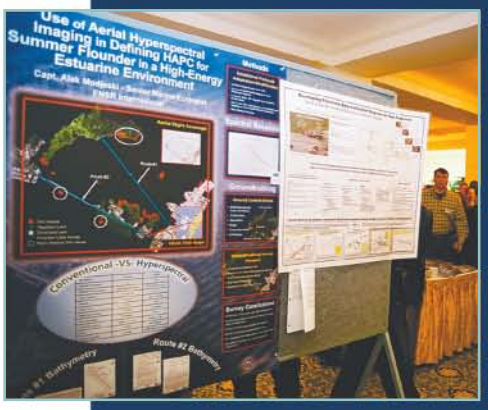

Submerged Aquatic Vegetation (SAV) Aerial Hyperspectral Imaging and Groundtruthing Survey: Use of Aerial Hyperspectral Imaging in Defining HAPC for Summer Flounder in a High-Energy Estuarine Environment

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To determine precise location of areas defined by NMFS as HAPC for summer flounder, ENSR, in conjunction with 3Di Technologies, Inc. and Barry Vittor and Associates, conducted a Submerged Aquatic Vegetation (SAV) Aerial and Groundtruthing Survey within Manahawkin Bay, Ocean County, New Jersey (3.75 sq. mi.). Conventional survey methodology used in Florida, Chesapeake Bay, and New Jersey were combined and modified to increase survey accuracy, increase field efficiency, and provide sufficient data for hyperspectral analysis.

The aerial survey was accomplished on July 5, 2002 and groundtruthing was performed on July 23, 2002. The survey was conducted to identify presence and absence of SAV beds within and adjacent to a proposed project area, establish precise location and extent of identified SAV beds, and determine percent coverage of identified SAV per meter of each survey site. Additional data collected at each survey site included: substrate type, vegetation composition, relative health of SAV, blade lengths (when applicable), random stem counts, presence of hard clam (*Mercenaria mercenaria*), and water quality. Maps provided by the New Jersey Department of Environmental Protection, Bureau of Shellfisheries; Rutgers University, Grant F. Walton Center for Remote Sensing and Spatial Analysis, and the Ocean County Department of Planning depicting SAV within Manahawkin Bay were further evaluated to better determine SAV location and compare findings. In addition, a hydrographic survey and Braun-Blanquet survey were conducted in August and September to determine accuracy of hyperspectral data based on seasonal dieback.

Project overview, methodology (modified using available resources and incorporating hyperspectral imaging technology), results and mapping, and conclusions comparing historical mapping efforts to results will be discussed. Further display will also discuss general overview of Manahawkin Bay, NJ (algal blooms, wasting disease, and anthropogenic stresses), conventional SAV survey methodology (Lockwood, 1991) versus hyperspectral imaging, hyperspectral imaging technology, and list various cost-effective applications of hyperspectral imagery to accurately delineate HAPC to include delineation of shoreline vegetation, wetlands, oyster and coral reefs, water quality, and oil spills.

Developing Electronic Data Collection Programs for Your Fisheries

Robert Mikol
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As fisheries management programs become more complex, the need for real-time data increases. The most efficient path for collecting, transmitting and analyzing data is electronically. This poster will illustrate the process of putting together several fishermen-based, electronic data collection programs in the Alaskan waters of the North Pacific.

Vessels engaged in fishing activities are in the unique position of collecting an assortment of very good, fundamental, and basic fisheries data. Many of the pieces of information that fisheries researchers and managers need are routinely inspected and noted by fishermen in the course of their harvest activities. In general, these information items include catch location, species composition, catch per unit of effort and cost per effort. Embedded in this information are key pieces of raw data that, with today's modern marine electronics and wheelhouse computers, can be and often are collected efficiently, accurately and effortlessly. Minimal electronic data sets include: gear type, set/retrieval time and position, fishing duration of gear, sea depth, gear depth and species composition.

Designing a good fishermen-based data collection program is both socially and technically challenging. Too often fishermen have seen the data of their fishing efforts used to further increase regulations and reduce their harvest opportunities. Fishermen must be shown direct benefits and be given incentives for sharing their data with government agencies and universities. Data collection programs that help fishermen prosecute their fishery or protect their fishing rights offer excellent benefits and will provide

managers with good data. The data that managers need should also provide fishermen with immediate access to other beneficial resources.

Once the data are off the vessel, the collecting agency should provide direct benefits to the fishermen that do not compromise the efforts of the private sector. These benefits might include providing information products from the data collected in real or near-real time. These information products could include harvest reports, weekly or monthly GIS analysis of catch, catch and weather, or catch and other oceanographic events. These products could then be distributed on a website or in local newspapers and trade magazines. Long-term benefits would of course be good fisheries management.

Technically, an electronic data collection program is very challenging. The fishermen/data collectors will need National Marine Electronics Association compliant electronics and modern harvest-grade computers. The fishermen must know how to use those computers. The data paths from the various marine electronics are rarely straightforward and often must be split or multiplexed. A data path must further be established from the vessel to the appropriate agency and the agency must be able to respond to the data collectors when questions or problems arise.

Developing and implementing an electronic data collection program is very difficult. There are many social and technical hurdles to overcome. However, with the proper approach, planning and patience, you can develop an electronic data collection program that fishermen will want to participate in and collect good quality data at the same time.

Marine Stewardship Council

Jim Humphreys and Kate Troll
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The Marine Stewardship Council's (MSC) fisheries certification and ecolabeling program has grown rapidly over the past five years from an idea to now having more than 170 labeled product lines in 11 countries. The MSC is dedicated to having an internationally recognized standard for sustainable and well managed fisheries. Fisheries wanting to use the MSC label voluntarily agree to be assessed against the MSC Standard by accredited, independent, third party certifiers working with a team of scientists.

The MSC took two years to develop an environmental standard for sustainable and well-managed fisheries, consulting fisheries and environmental scientists, fisheries managers and government representatives, environmental groups and a range of stakeholders from the seafood sector. The United Nations Food and Agriculture Organization's Code of Conduct for Responsible Fisheries was used as the starting point in the creation of the MSC Standard. The MSC Standard has three main elements: the Status of the Fish Stocks, the Impact of the Fishery on the Ecosystem, and the Effectiveness of the Fisheries Management System.

Seven fisheries have been certified under the MSC Program and eleven are currently undergoing full-assessment. In addition, approximately 30 other fisheries have completed pre-assessment — a confidential process and the first step in the assessment program. The Alaska Salmon Fishery was certified under the MSC Program in September 2000. Other U.S. fisheries participating in the program include the Bering Sea and Gulf of Alaska Pollock Fisheries; the Pacific Halibut fishery in U.S. waters off of Alaska, Oregon, and Washington; the Alaska Sablefish Fishery; California Chinook salmon and Oregon Dungeness Crab. While the certification process first and foremost recognizes sustainable management, it often identifies ways to improve and make the fishery more responsive to the ecosystem concerns. For some clients, the certification process is a valuable tool for promoting constructive change and research.

Commercial and consumer interest in the MSC Label is currently stronger in Europe than in the U.S., but progress is being made in the U.S. market. The nation's leading natural and organic retailer, Whole Foods Market, is promoting MSC labeled Alaska salmon nationwide in its 145 stores. Additionally, Xanterra Parks & Resorts features MSC labeled Alaska salmon in its restaurants in seven U.S. national park properties. In Europe, Switzerland's largest food retailer, Migros, has developed 26 new product lines based on three certified species with 17 originating from Alaska salmon. The U.K.'s second largest supermarket chain, Sainsbury's, continually sources new products with the MSC label. MSC founder and one of the world's largest buyers of frozen fish, Unilever is committed to sustainable fishing practices and encourages fisheries to enter into the MSC assessment process.

The MSC has a strong governance structure to provide decisions, advice, input, and direction from the Board of Trustees, the Technical Advisory Board, and the Stakeholder Council. The Board of Trustees is comprised of 14 individuals from five continents representing a broad range of sectors including science, industry, government and conservation.

The Development of a Bycatch Reduction Device (BRD) to Promote Escapement of Pacific Salmon from Pelagic Trawls Targeting Walleye Pollock

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In recent years, Chinook (*Oncorhynchus tshawytscha*) and chum (*O. keta*) salmon runs in western Alaska have been at relatively low levels compared to those observed over the last 20 years. These runs support large commercial, recreational, and subsistence fisheries throughout Alaska. Chinook and chum are caught incidentally in Alaska groundfish fisheries. From 1990-2002, an annual average of 37,795 Chinook salmon and 69,680 chum salmon were caught incidentally in Bering Sea and Aleutian Islands groundfish trawl fisheries, principally the fishery for walleye pollock (*Theragra chalcogramma*).

While seemingly large in terms of numbers, scientists have concluded that the bycatch of salmon in North Pacific groundfish fisheries is insignificant relative to average run size for major components of the salmon populations in Alaska. Additionally, the bycatch occurs at very low rates, on average less than one-tenth of a salmon per ton of pollock. These low rates make further reduction in bycatch a difficult and expensive proposition for the pollock fishery, a fishery recognized as one of the most selective fisheries in the world.

The North Pacific Council manages salmon bycatch via bycatch caps and closure areas, which are monitored by high levels of observer coverage on vessels and at processing plants. Regulations establish closures for areas with historically high bycatch if seasonal caps are taken. In 2000, new regulations to reduce Chinook salmon bycatch in BSAI trawl fisheries were implemented which incrementally reduced the bycatch limit for the pollock fishery from 48,000 to 29,000 Chinook salmon over a four-year period.

The pollock industry employs voluntary bycatch monitoring and avoidance to rapidly identify salmon "hotspots" and move fishing into lower bycatch areas. Pollock cooperatives formally adopted this system (called Sea State) under the American Fisheries Act of 1999. While individual accountability incentives within cooperatives have increased the effectiveness of area avoidance techniques, the "hotspot" approach has proven an expensive means of controlling salmon bycatch. Beyond costs for additional fuel and idle crew associated with moving vessels to lower bycatch areas, opportunity costs are often associated with forfeiture of areas with high pollock catch rates or fish quality. To address this, the pollock industry has spearheaded a cooperative research effort with NMFS conservation engineering scientists at the Alaska Fisheries Science Center. The goal of this work is to develop and test the effectiveness of excluder devices designed to allow escapement of salmon from pollock nets. Video and sonar observations provided insights into behavior differences between pollock and salmon during capture. Meetings with pollock fishermen generated concepts for exploiting these differences to allow salmon to escape with minimal pollock loss. Several prototype devices have been developed and these will be scientifically tested this fall and winter during NMFS research charters and an exempted fishing permit.

Our poster provides information on salmon bycatch management in Alaska, pollock industry and NMFS' cooperative research efforts to develop a bycatch reduction device, diagrams of prototype devices, and preliminary data from the first phase of field tests.

Development of a U.S. West Coast Collaborative Research Program, Working Together Towards Better Information

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The Pacific Marine Conservation Council is presently working with federal and state agencies, scientists and fishermen to develop a U.S. West Coast Collaborative Research Program. This program will provide a platform for ongoing and future collaborative research projects. It will also generate information on fishery research priorities, funding and contacts for interested scientists and fishermen, for which information from the West Coast and New England can be found online at: www.fishresearch.org. The need for systematically combining the expertise of fishermen with the scientific rigor of researchers is a theme that has clearly emerged through our involvement in federal and state fishery management processes. Collaborative research programs provide a unique opportunity for researchers of various disciplines who are interested in fisheries to collectively resolve complex issues. Through collaboration, federal agencies and fisheries managers benefit from the experience, equipment, and insights of fishermen, while fishermen participate in designing and conducting the research to gather data for superior management of the resource. The Pacific Marine Conservation Council strongly believes that sustainable fisheries depend upon implementing standardized and cost effective methods of collecting and analyzing data, and formally merging the skills and knowledge of fishermen and scientists. Collaborative research also has the potential to improve communication and trust between historically divergent stakeholders, while elevating the level of scientific understanding and enhancing conservation efforts.

Important Issues in the Management of New England Fisheries — A Report on the Sea Grant Regional Fisheries Education Workshop Series — 2002-2003

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Sea Grant Fisheries Extension Programs in Rhode Island, Maine, New Hampshire, and Connecticut, in partnership with the National Marine Fisheries Service (NMFS – Woods Hole, MA), organized and hosted a series of educational workshops on the topics of bycatch as it relates to New England fisheries, Marine Protected Areas as fisheries management tools, and rights based fishery management approaches. The workshops were conducted in all four states and were aimed at providing up to date information that could be used as a foundation on which to base future policy discussions. Commercial and recreational fishermen, environmentalists, state and federal fisheries managers, scientists, economists, students, and members of the general public attended the workshops. Within each topic area, common themes emerged. The concern about bycatch in New England fisheries centers on discards, particularly in the quota managed groundfish fisheries, and discard mortality. Workshop participants pointed to the need for accurate data quantifying discards verified by a strong Observer Program, more support of gear technology research, an expedited permitting process for experimental fisheries, flexible management measures tied to gear research results and field observations, and the overall development of a collaborative approach among fishermen, managers, environmentalists, and scientists to reduce the problem. The term Marine Protected Areas projects different meanings depending on the degree of permanency associated with the phrase "lasting protection". Initial results from case studies of closed areas in Canada and on Georges Bank indicate that this technique may have beneficial effects as a fishery management tool, although additional research is needed to evaluate this option within the context of the full range of fishery management tools available. In addition to biological and ecological effects, social and economic impacts need to be considered. Participants emphasized the need to establish an inclusive, participatory decision-making process based on good information early in the designation process. Goals need to be clearly defined, and assessment methodologies developed. Rights based fishery management approaches entail both use rights and management rights, and extend beyond the widely discussed option of Individual Transferable Quotas. Other options include limited entry schemes, community based management, and cooperatives.

Issues involved in this form of management revolve around the initial allocation of rights, transferability mechanisms, and management responsibilities and control. The overall conclusion of the workshop series is that there is benefit in providing an opportunity for diverse interest groups to come together in a neutral setting to share up to date information on issues such as the ones targeted. It serves as an important first step in recognizing common goals and identifying possible policy options.

The Trawl Codend Mesh Size Regulation in Gulf of Maine: What it Means to Fish and Fishermen

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Trawl codend mesh sizes and shapes are heavily regulated in each fishery to allow the escape of undersized fish and the retention of legal size fish. In mixed species fisheries such as the Gulf of Maine multispecies fishery, the regulation codend mesh size may be suitable for one species, but not for another. We conducted a comprehensive field experiment to evaluate the retention of commercial groundfish species by different trawl codends using the covered codend method aboard a 45-foot commercial fishing vessel. For easy handling of the codend and the cover, we designed, tested, and utilized a hydrodynamic kite-assisted codend cover to catch those fish swimming through the meshes of the codend. Five codends of different mesh sizes and shapes were tested: 6", 6 1/2", and 7" diamond meshes, and 6 1/2" and 7"square meshes. We analyzed retention and escape of major commercial species in Gulf of Maine including the Atlantic cod, haddock, yellowtail flounder, American plaice (dab) and witch flounder (grey sole). We discuss and illustrate benefits to fish and costs to fishermen if a codend of specific codend mesh size and shape is regulated for use in inshore Gulf of Maine.

Understanding Fishing Communities: Three Faces of North Pacific Fisheries

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Understanding and managing the impacts of fisheries means understanding fishing, and fishing communities, as much as understanding fish. Fishing communities are human settlements with a substantial level of dependence on or engagement in extraction of living marine resources. In the North Pacific, these communities are shaped by the interaction of productive and consumptive practices, resource availability, markets, and regulatory policies. The protection of these communities and their way of life depends on a careful appraisal of multi-faceted relationships with marine resources. At the Alaska Fisheries Science Center, this means developing techniques for social analyses that recognize how fishing is articulated around three different types of activities: commercial, subsistence, and recreational.

Public policy and science have often considered fisheries management to be almost exclusively concerned with commercial fishing. This perspective is understandable if we consider that commercial fishing accounts for 95% of the catch in Alaska, while subsistence accounts for just 4% and recreational 1%. The implications of this distribution for concerns such as biomass, ecological dynamics, and production of wealth are unambiguous. However, in the terrain of the social landscape, the much smaller catch percentages of subsistence and recreational fishing do not necessarily translate into insignificant social impacts. For example, in some communities, 100% of local households are participating in subsistence fishing, while only a small portion of residents are connected to the commercial fishing industry. In fact, leakage of wealth produced by the commercial fishing industry — through both imported labor forces and externalized corporate functions — is a significant factor attenuating the local impact of the commercial sector.

Our analysis of the fishing communities of Alaska, their social context and the productive implications of marine natural resources indicates that an approach which prioritizes commercial fishing to the exclusion of these other sectors is insufficient, and potentially misleading as to the social dynamics of both the complementary and conflicting interests which make up human communities. Subsistence and

recreational fishing are fundamental parts of the social structure, and also the economy of many Alaskan communities, often supplying different segments of the population than commercial fisheries.

At the Alaska Fisheries Science Center, anthropologists in the Economics and Social Sciences Research Program are involved in compiling profiles of North Pacific Fishing Communities. For communities located in Alaska, we have endeavored to describe and analyze the triadic relationship between commercial, subsistence and recreational fishing sectors. This is accomplished by characterizing the participation by community members in each type of fishery, and where possible, indicating the kinds of interrelationships that make the triad a dynamic and evolving social framework: competition for fisheries allocation, economic diversification of rural communities, joint production efficiencies, seasonal complementarities and conflicts, ethnicity and immigration issues, and local responses to the forces of globalization.

Fisheries management or public policy impact assessment that does not take into account this multiple and complex nature of the relation between fishing communities and marine resources may create substantial unintended impacts on the very same communities they are intending to protect.

Building Human Capital to Lead Twenty-first Century Fisheries

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The nations of the world confront complex challenges in managing fisheries resources in the twenty-first century. While attention focuses on the need for new institutional ideas, designing and implementing effective governance may be imperiled by inadequate investment in the human capital needed to lead, innovate, and manage. To address this challenge, the international workshop, Training Managers for Twenty-first Century Fisheries, was convened in Queenstown, New Zealand, on December 5-7, 2001. Sixty-three government, industry, academic, and NGO leaders from Oceania, North America, and Europe discussed fishery management problems and opportunities and defined the training, education, and professional working environments necessary to produce fishery managers capable of addressing twenty-first century challenges.

Participants described a future in which fishery managers confront a daunting set of problems and opportunities: balancing utilization and sustainability mandates, structuring and allocating property rights, defining and implementing ecosystem management, structuring cooperative research and management, contending with risk and uncertainty, solving international management, integrating fisheries within ocean governance regimes, and contending with oppressive bureaucracy and litigation. Participants agreed that given the enormity of the challenges, society has not adequately invested in the human capital capable of successful leadership and management of twenty-first century fisheries.

Participants illustrated the problems in fishery management by noting that biological scientists are often promoted by government agencies to management positions but have little formal training in fisheries management. Recruitment and retention of quality managers is expected to become a more pressing need given the impending retirement of one third of upper level managers within the next 5 years. Participants also noted that there are few academic or continuing education professional development programs providing fishery management curricula that integrate leadership, critical decision-making, and systems level thinking.

There was agreement that the definition of "fishery manager" has broadened in response to evolving institutions and increased participation. There was no single vision of a "fisheries manager," but depending on the governance system, there may be many classes of "managers" in the fisheries process, including: (1) stakeholders, (2) stakeholder representatives, (3) directors of private sector/NGO groups, (4) mid-level government managers, (5) lead managers of government agencies, (6) elected policymakers, and (7) policy analysts and institutional designers.

Creating managers who are leaders, innovators and creative decision-makers is a critical step toward achieving effective management of twenty-first century fisheries. Participants created a comprehensive list of curriculum needs and recruitment-retention strategies designed to further define competency levels and rigorous standards specific to each managerial class.

Participants agreed that success will require regional, national, and international commitment to the following eight priority strategies: (1) develop partnerships within and among institutions, sectors, and nations; (2) include the management process as a learning experience; (3) broaden and lengthen career paths; (4) identify the gaps between training supply and demand; (5) create a website with training opportunities and resources; (6) encourage industry scholarships; (7) develop a case study library; and (8) establish a training provider network.

An international steering committee was established to facilitate this initiative. The workshop report and additional information is available at: http://oregonstate.edu/dept/trainfishmngr.

Putting GIS to Good Use: Protecting Fish Habitat in New England

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Geographic information systems, or GIS, are multipurpose tools. Hundreds of agencies in national governments throughout the world use GIS technology to handle large amounts of data, anticipate problems, communicate information and reduce costs.

The use of GIS could also be used to improve the efficiency and performance of NOAA Fisheries Habitat Conservation programs. For instance, integrating the GIS tool with existing methods could assist staff in assessing potential adverse impacts of permit actions and civil works projects conducted by the Army Corps of Engineers and other federal agencies. GIS could also be used by Fishery Management Councils to communicate quickly and easily any refinements made to essential fish habitat (EFH) designations, Habitat Areas of Particular Concern, or other area management schemes. Spatial information improves understanding, transparency and communication of alternatives to all parties and should therefore have a streamlining effect on environmental review.

A great deal of information can be compiled and displayed through a GIS product. Data are currently available for benthic habitats important to fishery resources, such as submerged aquatic vegetation and sediment/substrate types, bathymetric and hydrographic information, activities that may indirectly effect fishery resources, such as sewage treatment facilities and power generation outfalls, contaminated sediments, industrial effluent, underwater pipelines and cables. Information is also available in GIS format that provides location of restoration activities conducted by NOAA Fisheries and other federal and non-federal resource agencies. These data can assist in determining whether or not proposed actions will have an adverse effect on public investments in restoration, and maps containing these data could reduce many pages of descriptive material in an environmental analysis to a few pages.

In the near future, GIS will likely replace the existing EFH and managed species life history maps developed by NOAA Fisheries. These spatial data, when in a GIS format, will provide much more information than existing maps and could be integrated with other GIS data layers, such as commercial fishing activities, benthic habitats and substrate types. GIS can also address the difficulty of incorporating traditional knowledge into decisions, such as fishers' anecdotes and observations, and provide a way to bring them into the decision arena. Given the trend toward ecosystem-based management, organizing complex data for multi-faceted issue analysis is a much-needed capability that this tool can provide.

This poster is a simple demonstration of how GIS could be used by the Habitat Protection Division to help protect and conserve the EFH and living marine resources of New England and what steps should be taken to begin to realize these potential gains in environmental performance.

The Prince William Sound Science Center: Pioneering Ecosystem-Based Operational Fisheries Through Advanced Technology

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The concept of the ecosystem as a fundamental unit of study has been well established since the 1970s. Inherent in the approach are a definition of a regional scale with some coherent physical and biological structure, and comprehensive physical and biological studies integrated through the development and application of models. Although the ecosystem approach has become common in oceanographic studies, the concept has been generally neglected in fisheries management in lieu of single-species approaches that typically fail in response to broad changes in ecosystems, such as climate regime shifts or habitat alteration. Further, the oceanographic studies have not adequately addressed the upper trophic levels, including fish, for a variety of reasons, including their complexity and lack of effective survey tools

The Prince William Sound Science Center was formed in 1989 as a non-profit, private corporation to improve public access to information following the *Exxon Valdez* oil spill in 1989. The leadership of the Science Center recognized that an understanding of the ecosystem was essential to efficient prioritization of oil spill technologies. That recognition eventually became the foundation for the development of the Prince William Sound Nowcast-Forecast Information System.

The Nowcast-Forecast Information System is a comprehensive physical and biological program combining operational research and monitoring with complex numerical models. The upper trophic level monitoring effort includes a stress on techniques with high sampling power, such as acoustics, as well as application of optimal sampling theory. The program allocates effort in proportion to overall abundance by focusing on dominant biomasses and uses information on the temporal and spatial characteristics of the target species to design the most efficient survey strategies.

The program has successfully monitored the abundance of pollock and herring for the past decade. Research has shown that the post-*Exxon Valdez* oil spill herring decline was exacerbated by overfishing that resulted from the application of ineffective management techniques. The addition of infrared sampling technology has allowed documentation of the critical role of herring as forage for marine birds and mammals, including the endangered Steller sea lion. Herring provide a readily accessible source of carbon to near-surface predators. In contrast, pollock are less dense, deeper in the water column and lower in caloric value. Consequently, the outcome of the competition for dominance between herring and pollock has immense ramifications for marine birds and mammals.

Recent applications of underwater optical technology have increased the efficiency of the acoustic surveys through rapid species identification. Applications to zooplankton assessment show considerable promise. Marine survival of juvenile salmon shows high correlation with the acoustic estimates of the zooplankton abundance in Prince William Sound. The consistent and long-term application of these high-speed sampling technologies is critical to our understanding of ecosystem processes and their impact on the abundance and composition of pelagic fishes.

Saltwater Observer Company

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Saltwater is an Anchorage based company that started providing personnel services to the fishing industry in 1985 and began focusing exclusively on observer programs after becoming a certified observer contractor in 1988. *Saltwater* clients include the National Marine Fisheries Service (NMFS), the Alaska Department of Fish and Game, and a variety of public and private fishing organizations.

Our office staff has extensive experience in recruiting, deploying and retaining observers; tracking fleet effort and ensuring that observer coverage meets the level required for the fishery; responding to client needs; and solving the myriad challenges inherent in observer logistics. Many members of our office team also have personal experience as observers.

Saltwater's observers are expected to maintain the highest professional standards in data collection, communication, client confidentiality and personal conduct. They are carefully selected to ensure that only individuals with the maturity and flexibility necessary to cope with the challenging conditions of the job are deployed. While on board vessels, observers identify fish species and collect and record data on the sex, length and quantity of species caught. These fishery data are used by NMFS and the Alaska Department of Fish and Game to manage the commercial fisheries.

In 1990 and 1991 *Saltwater* was selected by NMFS to design and implement an observer program to gather data on interactions between marine mammals and three salmon gillnet fisheries in South Unimak and Prince William Sound, Alaska. This contract was unique in that *Saltwater* also designed the sampling methodology and database and was responsible for preparing a post-season analysis of the data.

In 2000, NMFS selected *Saltwater* to conduct an observer program to achieve the mandated coverage goals of the Hawaii Longline Observer Program. In 2003, NMFS expanded the Hawaii Longline Observer Program to the Pacific Island Region Observer Program and again selected *Saltwater* to manage the program.

In 2003, Pacific States Marine Fisheries Commission selected *Saltwater*, in cooperation with NMFS, to test a new method of deploying observers on vessels participating in the Gulf of Alaska rockfish and flatfish fisheries. *Saltwater* also has valuable experience in deploying observers in numerous research projects, such as a net mesh configuration study, chum salmon bycatch stock identification, longline surveys and flatfish data collection during a salmon fishery.

Currently, *Saltwater* provides observers in the groundfish, crab and scallop observer programs in Alaska and in the pelagic longline, bottomfish and experimental fisheries in Hawaii. *Saltwater* has supplied crab observers, through competitive bid contracts with the State of Alaska, every year since the Shellfish Observer Program began contracting for observer coverage,

The *Saltwater* management team has the skills and experience to ensure that coverage goals are always met, observers are deployed safely and efficiently, and staff is available 24/7 to work with observers and clients. The observer business is the only business conducted by *Saltwater*. It is our focus and it is what we are good at. We are not a consulting firm or a personnel company, and we have only one agenda: to provide the highest quality observers — and data — to our clients.

Industry-Government-University Cooperative Research: Closing the Data Gaps

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The fishing industry has become cognizant of the need for improved research into stock dynamics and data relevant to harvest level estimation. The increased burden of research required by changes in the Magnuson-Stevens Act and the continual judicial appeal of management decisions has resulted in a shortage of funds and people to provide the data needed for informed management decisions. The fishing industry has come to realize that they need to help fill the data gaps in order to provide for fisheries sustainability. An increasing amount of cooperative research has been developing along the Pacific Coast which has largely gone unnoticed, but is starting to return benefits in terms of increased fishing opportunity, yield, and general stock information. This presentation examines different forms of cooperative research between National Marine Fisheries Service and fishing organizations which may provide models for other organizations.

Bridging the Gap to Build Collaborative Research, Science Communication and Industry Participation in New England Fisheries Management

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Fishermen, scientists and managers must cooperate to restore and manage marine fisheries in the New England region. They face daunting challenges. Communication barriers and a lack of trust in fishery science and the management decision-making process has led to a "taking sides" atmosphere that can produce inconsistent results, delayed decisions, and high levels of frustration on the part of participants. Fishermen must modify historic fishing practices and become highly adaptive to achieve sustainable fishing goals. Scientists must strive to improve channels of communication and facilitate dialogue to achieve greater faith in science. Managers must attempt to balance impacts within multiple complex structures, including social and economic, while "keeping an eye on the prize." In an attempt to build additional capacity that could facilitate a more collaborative and problem solving approach to decision making in the New England region, the Marine Resource Education Project was initiated in the summer of 2001 to improve chances of building a successful fisheries management regime.

The impetus for the Marine Resource Education Project came from experienced fishery leaders and researchers who were seeking a way to enhance the effectiveness of the relevant stakeholders' participation in fisheries policy and management decisions. Funded by the Northeast Consortium, it involves fishermen, scientists, and managers, along with educators in collaboratively planning and delivering a curriculum designed to engage the knowledge and skills of each sector. Participants engage in two three-day workshops, one on Fisheries Science, and one on the Fisheries Management Process. Participants commit to six days of intensive training. Program goals are designed to engage these three groups in an educational process designed to: (1) improve fishermen's understanding of the fisheries science used to inform management decisions, (2) improve scientists' understanding of fishermen's knowledge about fishing and their understandings about how marine ecosystems work, (3) improve fishermen's understanding of the New England Fishery Management Council and National Marine Fisheries Service roles and decision making processes and provide skill training to support the effective participation of fishermen in fishery management decisions, (4) build skills of all participants for multiparty decision making, and (5) encourage collaborative science. Planning and project policy guidance is provided by a Board of Directors representing the three perspectives. Workshops are delivered by the project's Implementation Team and expert presenters from cooperating institutions and communities (e.g., knowledgeable fishermen, University of New Hampshire, National Marine Fisheries Service's Northeast Regional Office, Northeast Fisheries Science Center, New England Fishery Management Council, Manomet Center for Conservation Science, and the University of Maine.) As of April 2003, three sets of the workshops have engaged 60 fishing community leaders and about 30-35 marine resource professionals (i.e., resource managers, academics, scientists, trade association executives, and environmentalists). Ongoing feedback from the full range of participants indicates a very positive response. An in-depth evaluation will be initiated in 2003.

Enhancing Fisheries Management Through In-Store Labeling

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Recently, conservation groups have increased efforts to address the issue of ensuring sustainable fisheries by influencing consumer preferences. These attempts have tended to focus on web-based campaigns, publications, and "wallet cards." These methods provide general information and often rank seafood according to sustainability levels. While these programs have raised the consciousness of consumers, a survey by Seafood Choices Alliance (2003) has shown that labeling at the point of sale was the preferred method of disseminating information. Providing accurate and concise information is vital to point of sale labeling. The Sustainable Fishery Advocates work with markets and restaurants to help provide a dynamic and accurate labeling system that incorporates harvest method, biological information, and harvest locations. Our method allows for lists to work dynamically. They can change in real time to reflect the specific source of the seafood. Sustainable Fishery Advocates' pilot program has shown that consumers will preferentially choose the more sustainable choices when suitable alternatives are provided. After

implementing our program, the market saw their total fish sales increase by 9%, while their sales of "best choice," or most sustainable seafood, increased by 22%. This increase was due solely to changes in consumer preferences from education, rather than changes in supply by the market. Furthermore, this program had growing influence beyond the market, attracting the interest of a distributor hoping to develop a sustainable seafood line.

Influencing business by changing demand is a well-established method of changing industry. Most of these examples, however, are in the form of boycotts. While this approach may work in some realms, the complexity in fisheries means that boycotts simply punish those who fish sustainably along with irresponsible fishermen. With the method employed by Sustainable Fishery Advocates, those who are fishing responsibly and sustainably will be selectively supported.

Economics — The "Other" Discipline: An Exploration of the Use of Economics in Habitat Conservation Programs

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NOAA Fisheries has stewardship responsibility for living marine resources. Under the Magnuson-Stevens, Endangered Species, Marine Mammal Protection, and Fish and Wildlife Coordination Acts, the responsibilities of NOAA Fisheries cover the gamut from endangered and threatened species to fisheries, and to their collectively extensive habitat requirements. The enormous scale and complexity of this stewardship responsibility prompts close-working partnerships with the coastal states and regional bodies such as the Atlantic, Pacific, and Gulf States Marine Fisheries Commissions and eight Fishery Management Councils. Maintaining these partnerships requires that each is aware of new directions undertaken by the other.

Emerging strategic concepts within NOAA will no doubt affect all these groups working together with NOAA Fisheries. These concepts include a move toward holism, involving multiple disciplines and which is expressed in the NOAA Fisheries Regulatory Streamlining Program with its emphasis on the National Environmental Policy Act and integrating the social sciences. Ecosystem-based conservation and management and organizational matrixing can also be taken as signs of holism. Another NOAA-wide strategic concept can be referred to as "fiscal accountability" and involves measurement and demonstration of the value of federal programs to the American public, including conservation programs. Examples include the new budget programming, performance metrics, and other quantifying procedures. To keep in step, the Office of Habitat Conservation in Fisheries is exploring the applicability of these concepts, one of which is the use of economics, to its programs relating to non-fishing impacts on fish habitat.

Endangered species and overfished fisheries are typically hot button issues because they affect people visibly and directly. The economic importance of sustaining fisheries is documented through analysis of economic data collected along with landings data. The economic value of endangered species is essentially "incalculable" and is given the highest priority. However, habitat protection, which is the single-most effective preventative measure for endangered species, is often left with only a general acknowledgment and recognition of its economic importance.

Although applying economics to habitat protection will move it toward holism, the challenge will be in the quantification/measurement department. Valuation of non-market goods such as habitat assets is a long-standing problem, which often results in underestimation of that value. In addition, NOAA Fisheries recognizes that changes in traditional environmental review require broad participation and a shared understanding of the need for and benefits to be realized from this change. At a habitat workshop in early 2003, a method called "Open Space" allowed self-organized teams from a cross-section of field offices, science centers and partnering agencies to tackle the complex issue of habitat valuation. Open Space encourages fluid engagement, spontaneity and creativity. It is a metaphor for self-organizing or renewing systems and creates structure that fits the situation. What emerged from the Open Space session was an employee-generated action plan containing 5 themes and 18 initiatives for action. This poster will present some of the issues inherent in integrating economics into the traditionally biological/ecological realm of habitat protection, as well as the effectiveness of the Open Space process.

Massachusetts Fishermen's Partnership

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Since 1996, the Massachusetts Fishermen's Partnership (MFP) has been promoting and protecting community interests throughout the state and region. Representing 18 commercial fishing associations from all gear and geographic sectors of the Massachusetts fishing industry, the MFP was created to promote the common interests and economic viability of commercial fishermen and fishing families. To do so, the MFP offers access to sliding-scale health care for fishermen and their families, promotes collaborative research between fishermen and scientists to address some of the most pressing issues facing the fishing industry today, and maintains a vigorous presence in fishing policy advocacy.

MFP's programs include:

- MFP is sponsor of the Fishing Partnership Health Plan, which provides comprehensive healthcare coverage for approximately 18,000 members of the fishing community;
- MFP, in conjunction with MIT Sea Grant, is undertaking an innovative socio-economic study to establish a community-based project for gathering and assessing data to enable communities to regularly comment on and describe potential real-time impacts of proposed regulations;
- MFP is working with Stellwagen Bank National Marine Sanctuary to ensure that fishing interests are represented in the development of a five-year management plan for this prolific area;
- MFP is initiating a planning process that includes the participation of Stellwagen Bank National Marine Sanctuary staff to develop collaborative research priorities in the Stellwagen Bank National Marine Sanctuary and to coordinate an interdisciplinary, ecosystem approach to fisheries research that will support future management initiatives;
- In collaboration with local fishermen and scientists from Boston University, MFP is facilitating a project that examines habitat-dependent catch composition and food web dynamics with respect to long-term and rolling closures; and
- By requiring participants to adhere to a strict quality protocol, MFP is designing a program that promotes the unique quality of locally harvested fish to increase the value of the catch and to provide the public with the highest quality fresh seafood.

MFP is a unique statewide organization that addresses issues on local, state, and federal levels and collaborates with fishing organizations, government agencies, the New England Fishery Management Council, academic and research institutions, funding entities, and the general public. It is extremely involved in shaping the marine fishery management process, coordinating and managing current collaborative research programs, and informing future management and marine research initiatives. The MFP plays a critical role in sustaining both the fishing way of life and the future viability of local fisheries.

Use of Hydraulic Clam Dredges on Benthic Habitat off the Northeast United States

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Hydraulic clam dredges have been used on the east coast of the U.S. since World War II. This equipment has evolved over time from marginally effective and habitat damaging to a highly effective type of fishing gear. Improved design has minimized the effect on habitat. Natural events have more effect on the benthic community than this type of fishing gear since all of the fishing activity occurs in sandy bottom in less than 80 meters depth. The Chiarella *et al.* (2002) paper on the Northeast U.S. Gear Effects Workshop (Boston, October 2001) concluded that hydraulic clam dredges were not a major concern relative to otter trawls and scallop dredges.

The Mid-Atlantic Fishery Management Council concurred with the conclusions of that workshop and acknowledged that hydraulic clam dredges could have a potential adverse effect on EFH if fished

improperly or in inappropriate sediment type. The Council concluded that only a small amount (about 100 square nautical miles) of fairly widespread homogeneous sandy bottom was fished annually and that any EFH impacts would be temporary and minimal in nature. However, the Council did evaluate seven alternatives to minimize any potential impacts of hydraulic clam dredging. Five of these seven alternatives would close various important sections of the ocean to hydraulic clam gear. The Council concluded that the no action alternative should be maintained and that no management measures were necessary.

The Marine Protected Area Virtual Library

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Marine Protected Areas in the United States had their regulatory inception with the promulgation of Executive Order 13158. NOAA was directed in that order to establish a National Marine Protected Area Center to provide federal and non-federal partners with the following foundation for the express purpose of building the national system of MPAs based on:

- Science behind MPAs;
- Tools for assessment of economic impact and effectiveness of MPAs; and
- Strategies for enforcement of MPAs.

Current, reliable information and a means of sharing that information are vital tools to building a national system of MPAs. The National Marine Protected Area Center sought the assistance of NOAA's Central Library professional staff in 2000 to coordinate several types of MPA information resources. The MPA "virtual" library on the Center's web page (http://mpa.gov/mpaservices/mpa_library.html) is a focal point for all types of MPA information. The content is organized by the following resources:

- Bibliography—citations to articles, books, manuals, research papers, reports, and proceedings on MPAs;
- Institutions and Organizations—list of governmental and nongovernmental entities involved in research, analysis, and management of MPAs;
- MPA Web Sites—list of Web sites describing MPA programs, policy, and research; and
- Conferences and Workshops—meetings that focus on the management and science of MPAs.

Each collection may be browsed separately, or the entire collection may be searched using the MPA Library Search. Because we want the website to be useful to the MPA community, comments are welcome.

Short-term and Long-term Impacts of Hurricanes on North Carolina's Commercial Fisheries

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The impacts that hurricanes and tropical storms have on natural ecosystems have been well studied; however the impacts that these storms have on commercial fishing resources and industries has not been well documented. During the 1990s, a number of hurricanes made direct landfall in North Carolina including two hurricanes in 1996 (Bertha and Fran), one in 1998 (Bonnie) and two in 1999 (Dennis and Floyd). These hurricanes varied in strength, location and time of landfall, duration and precipitation, which resulted in differing effects to the estuarine and coastal resources of North Carolina. A multiple regression analysis of the commercial landings for North Carolina is conducted to determine the magnitude of the immediate short-term impacts and long-term impacts that hurricanes had on North Carolina's commercial fisheries. Variables included in the analysis include landings in pounds, changes in effort measured by the total number of trips, catch-per-unit-effort (pounds/trip), year, month and week.

This analysis will focus on major fisheries conducted in Pamlico Sound, Pamlico River and Neuse River including hard blue crabs (*Callinectes sapidus*), southern flounder (*Paralichthys lethostigma*), weakfish (*Cynoscion regalis*), spot (*Leiostomus xanthurus*) and shrimp (Penaeid species). Short-term declines in

landings will most likely be due to declines in effort as participants prepared for the upcoming storms instead of operating in their respective fisheries (e.g., bringing up gear, boarding their houses, etc.) and may also be due to fishery resources being displaced by hurricane force winds, currents and floods. Long-term declines in landings will most likely be due to changes in the environment following a hurricane and may include such things as nutrient input, salinity, freshwater inflow and sediment loading. Determining and understanding the different effects that these hurricanes have on North Carolina's commercial fisheries will help in developing management options and schemes by giving managers a better understanding of how the resource and the industry responds to these large natural disturbances.

Turning Gear Research into Effective Management: A Case History

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A vibrant gear research community in the U.S. northeast has, especially recently, engaged in multiple conservation engineering research projects: projects that investigate new or redesigned fishing gear that reduce impacts on non-target species, or bycatch. However, the course from well-tested gear to management implementation has largely been uncharted. The inability to convert good research into practical solutions has been a source of frustration to scientists and fishermen alike.

The successful creation of an exempted small-mesh whiting *(Merluccius bilinearis)* fishery off Provincetown, Massachusetts with a mandated trawl net, the raised footrope trawl, provides an instructive example of navigating from a good idea to a cleaner fishery. Starting from tinkering with net designs, the Massachusetts Division of Marine Fisheries was able to shepherd the establishment of an exempted fishery where the raised footrope trawl is required. This poster describes a lengthy, but passable, voyage of the raised footrope trawl into successful implementation, examining the policy implications along the way. We present this information as a potential model for other gear researchers interested in seeing good results put to good use.

Bayesian Network Models for Analyses of Essential Fish Habitat Requirements

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Work on Essential Fish Habitat (EFH) environmental impact statements (EIS) for the Pacific, Gulf of Mexico and U.S. Caribbean Regions has led to the development of an analytical procedure for consolidating available information and using that information to model EFH, Habitat Areas of Particular Concern (HAPC), and impacts of fishing on EFH. This procedure is designed to make scientific assessment the basis for policy decisions. Major data categories are:

- Physical Habitat — a Geographical Information System (GIS) containing bottom type, location, bathymetry, latitude, and other structural considerations;
- Fish Distributions and Habitat Preferences — from NMFS survey data, distribution information, life history and habitat use literature reviews;
- Fishing Effects — a GIS for spatial fishing information, and a review of gear operations and sensitivity of habitats to gear;
- Non-fishing Effects — a GIS for spatial information, and a review of non-fishing and sensitivity of habitats to the activities; and
- Existing Habitat Protection—a GIS with Marine Protected Area inventories and other regulatory (e.g., closed) areas.

Designation of EFH for a fishery is achieved through an accounting of the habitat requirements for all life stages of all species in a Fishery Management Unit. Thus, the description of EFH uses information from the Physical Habitat and Fish Distributions and Life Histories components. But not all utilized habitat should

be designated as EFH. The value of habitats as EFH for the Pacific Coast Groundfish EFH process is evaluated using a Bayesian Network (BN) model that takes information about the preferences of species/life stages for certain habitat conditions and uses this to plot habitat suitability probabilities by species and life stage, where possible, across the habitats mapped in the GIS. A probability is calculated that a habitat polygon is of a particular substrate type, depth range and latitude, based on the uncertainty in the data. For each substrate type, a habitat suitability score is available. Hence the final probability of a parcel being suitable for a given species or life stage is the combination of the expected habitat characteristics and the suitability score for those characteristics. The identification of EFH can then proceed based on a policy decision regarding the threshold probability above which the polygon is identified as EFH, and below which it is not.

The following considerations guide the designation of HAPCs: the importance of the ecological function provided by the habitat, the sensitivity to human-induced environmental degradation, stress on habitat from development activities, and the rarity of the habitat type. The BN model for Pacific Coast Groundfish HAPC calculates a score, quartile or similar measure for each of the four considerations, and calculates a relative risk to habitat. It is relatively easy to use the model to determine HAPC by measuring whether a characteristic exceeds a management threshold, or if the overall relative risk exceeds a management threshold.

A BN model risk assessment is under development for Pacific Coast Groundfish that is designed to isolate areas of vulnerability and adverse impact. The model will assess the impacts on EFH, and the extent to which the fishery and the ecological function of habitat can be enhanced by changing anthropogenic activities. The output of the risk assessment will be presented in a GIS format to facilitate spatial consideration of management alternatives. The main data sources for this model are: sensitivity of habitats to contact from fishing gears, rates of habitat recovery from gear impacts, historical fishing effort (amount and frequency) by area, and non-fishing impacts.

FishResearch.org: Bridging the Gap between Scientists and Fishermen

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FishResearch.org is a website designed to provide a neutral, accessible information marketplace to support collaborative fishery research. It brings information about fishermen, scientists, funding sources, research priorities, and project reporting together in one place.

Until recently, "collaborative research" has typically meant a group of scientists or institutions working together, sometimes representing diverse disciplines — such as an oceanographer, a chemist and a marine geologist undertaking a project. Today, collaborative research or cooperative research often refers to a scientific research project involving both fishermen and scientists working together. The level of involvement can range from a fishing vessel being chartered as a research platform only to a fisherman and scientist jointly designing and implementing a research project of mutual interest. These types of relationships have been on-going throughout the U.S. for some time, though they may not have been identified by the specific terms in use today.

Although in the past a charter relationship was most typical, recently there has been an increasing interest among scientists, fishermen, and managers across the U.S. to promote and support collaborative fishery research arrangements that integrate fishermen as true partners. This interest stems from a desire to break down the barriers between the scientific community and the fishing community, an increased appreciation for the synergy created through combining the expertise of fishermen with the scientific discipline, and the acute need to generate more data about the marine environment in a cost-effective manner with which to better manage our fisheries.

In New England, a concerted effort has been made to increase the number of collaborative research projects, through funding and establishment of the Cooperative Research Partners Initiative at the NMFS/Northeast Regional Office and the Northeast Consortium at the University of New Hampshire. These two initiatives have generated nearly 100 new projects in the New England region. On the West Coast, action is

being taken through a diverse array of potential partners to establish an organized and coordinated collaborative research program.

FishResearch.org was developed through a cooperative effort among fishermen, scientists, marine research institutes, and marine NGOs to facilitate the partnerships needed to make collaborative fishery research happen. The website was launched in New England in 2000 but has now expanded to cover West Coast research as well. This web site is a virtual market place for fishermen to learn more about cooperative science and how to become involved in this new economic opportunity — "Fishing for data." Scientists, in turn, can search the site for vessels that suit their needs and also learn about other cooperative research projects taking place in the Gulf of Maine and West Coast.

FishResearch.org has demonstrated the value of a shared, neutral source of collaborative fisheries research information in its initial development. There are currently over 50 scientists and 105 vessel owners who have used the templates available on FishResearch.org to make themselves available to cooperative research partnerships. FishResearch.org has been identified as the most comprehensive web-based resource for collaborative research information.

NOAA Fisheries' Developing Social Science Program

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Managing the Nation's living marine resources requires understanding people's relationships to those resources — for human beings are major actors in fisheries ecosystems, impacting and being impacted by the full array of marine habitats from the Nation's coastal zones to the deep waters of the globe's oceans. Several legislative mandates, for example the National Environmental Policy Act, the Marine Mammal Protection Act, and the Magnuson-Stevens Fisheries Conservation and Management Act, require NOAA Fisheries to examine both the impacts of humans on marine resources and the impacts of marine resource management on humans. The agency is charged with conserving marine resources, which often means restricting both commercial and recreational fishing access to these resources. The legislative mandates also require analyses of regulatory impacts on the fishing industry and fishing communities — especially those that are "substantially engaged in" or "dependent on" fishing as a way to earn a living and maintain a way of life (Magnuson-Stevens Act, National Standard 8, 1996). While it has had in-house economic expertise, NOAA Fisheries has only recently begun to develop the rest of its social science program so that it can better assess the social and cultural impacts of its regulatory actions on the Nation's fishing ports and fishing communities — including as required under National Standard 8. This poster describes the highlights of NOAA Fisheries' current social science program and its near and long term research plans to support the agency's mandates to manage the Nation's marine resources while, insofar as possible, sustaining fishing communities.

Gearing up for Ecosystem-Based Fisheries Management: A Comprehensive Assessment of Gear Impacts

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Problems in fisheries are traditionally associated with overfishing, i.e., with the deployment of "too many" fishing gears. While that is still the case with several fisheries around the world, there emerges a need to understand collateral impacts of fishing methods on habitats and incidental take, or bycatch, especially when ecosystem-based management of fisheries is the goal. Assessing collateral impacts, through an integration of knowledge of a wide range of fisheries stakeholders, is an important element for ecosystem

management, especially when results can be obtained by consensus. We demonstrate this by using the "damage schedule approach" to elicit judgments from fishers, scientists and managers about the severity of fishing gear impacts on marine ecosystems. Ten fishing gears commonly used in U.S. waters were assessed in terms of their impacts on bycatch and habitats through a series of exercises involving scientists, fishers, fishery managers and environmental groups. The consistent ranking of fishing gears obtained from all respondents reflects the impact of gears at the national level but can easily be modified to incorporate gear types and fisheries at the local level. This ranking allows local and national level managers to consider the impacts of all gears at once, while also giving them the ability to prioritize the issues surrounding gear management, an important step in ecosystem-based management. From here they will be able to formulate fisheries policies that will help restore fisheries and ultimately maintain healthy marine ecosystems. Such policies include shifting from more to less damaging gears, and establishing closed areas to limit their collateral impacts.

Reducing Bycatch Through Avoidance: Utilizing Near-Real-Time Catch Sampling and Analysis of Spatial Patterns in Occurrence of Bycatch Species to Provide Fleets with the Information Needed to Avoid Bycatch

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Trawl fleets operating off the coasts of Washington, Oregon and Alaska face stringent quotas imposed on the bycatch of salmon, crab, halibut and rockfish. Exceeding bycatch quotas can lead to closures of either pre-set duration or area, or of entire fisheries. Bycatch of halibut or crab, rather than complete harvest of the Total Allowable Catch, typically limit the flatfish trawl fleet. Bycatch of salmon or (less often) herring can result in large areas closed to pollock fishing, while rockfish and salmon bycatch affect the whiting fishery off Washington and Oregon.

Most catcher-processors in these fleets must carry either one or two federal observers who sample catch and file information daily with the North Pacific Groundfish Observer Program office in Seattle. Vessels delivering shoreside have all bycatch weighed at the plant, and that information is also sent to the observer program office in Seattle. Observer information is made available to vessel owners who contract with Sea State, Inc. to receive this information and provide daily analysis of spatial trends in catch data. Observer data are available to Sea State, Inc. (as the owners' agent) on a 24/7 basis via an automated web site maintained by the North Pacific Groundfish Observer Program. In addition, catcher vessels relay bycatch data by e-mail or VMS-based catch logs to make information available while they are still at sea. Maps, tables and commentary are relayed back to the fleet on a daily basis, allowing for rapid reaction to areas of high bycatch.

The recent development of cooperatives for harvesting pollock and whiting has led to the implementation of a complex program of voluntary area closures, with selective access to these areas for fleets that can demonstrate success in controlling bycatch. These "hotspot" closures can change weekly and require significant effort on the part of fishermen to both supply and keep abreast of current bycatch information. Although complex, these programs can lead to appreciable bycatch reduction, and increased fishing opportunities for fleets that might be otherwise restricted.

Theoretical and Actual Biological Effects of Rationalization in the Alaskan Pollock and Halibut/Sablefish Fisheries

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Rationalization of fisheries management (including IFQs, ITQs, and cooperatives) is utilized primarily to achieve economic and social objectives. The biological consequences of rationalization are largely theoretical and are based on predictions of the fisheries' market and human fishing behavior. Very little analysis has been conducted to verify whether the anticipated biological effects have occurred or not. The

question central to my thesis is: Do rationalization programs produce the anticipated biological impacts? And are there additional biological effects from rationalization that were not predicted?

This poster will examine biological assumptions made for the pollock and halibut/sablefish rationalization programs. Additional research will be required to determine whether these assumptions were realized. To complete this research, I intend to collaborate with other researchers and industry contacts to gain new insight on how rationalization programs have altered biological aspects of the fishery. Furthermore, it will be important to acknowledge those assumptions that cannot be verified due to lack of information. Gaps in data will allow me to recommend monitoring and research for future rationalization programs.

Cooperation to Protect Essential Fish Habitat

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On April 11, 2003, the U.S. Coast Guard (USCG) and Maritime Administration (MARAD) initiated an essential fish habitat (EFH) consultation on the first application for a liquefied natural gas deepwater port license. Port Pelican LLC applied for a deepwater port license to construct and operate the Port Pelican liquefied natural gas deepwater port in the Gulf of Mexico. The Proposed Action consists of construction and operation of an liquefied natural gas receiving, storage, and regasification facility and the installation of a pipeline to transport regasified liquefied natural gas to a gas gathering system. Engineering-environmental Management, Inc. (e^2M) provided USCG and MARAD technical assistance in the preparation of the Environmental Impact Statement, which served as the EFH Assessment.

Throughout the consultation process, National Oceanic and Atmospheric Administration (NOAA) Fisheries expressed concerns regarding the impact of the Port Pelican regasification system on ichthyoplankton (i.e., fish eggs and larvae). The regasification system consists of an open rack vaporizer that uses seawater to warm liquefied natural gas. During normal operations, 141 million gallons of seawater per day would be used. Seawater would flow through intake screens, which eliminate debris and marine life, before being pumped through the open rack vaporizer.

To determine the potential impact of the proposed regasification system on ichthyoplankton, South East Area Monitoring and Assessment Program ichthyoplankton data were used to characterize the numbers and types of fish eggs and larvae potentially entrained by the proposed Port Pelican regasification system. South East Area Monitoring and Assessment Program data indicate an average of 746 million eggs and 1.4 billion larvae per year could be entrained during normal operations after Port Pelican is complete.

Based on NOAA Fisheries' EFH Conservation Recommendations and discussions on engineering feasibility with Port Pelican LLC, mitigation measures to avoid and minimize the impact of entrainment were incorporated into the proposed design and operation of the open rack vaporizer. It is anticipated that USCG and MARAD would require the following mitigation measures as conditions of the Port Pelican Deepwater Port License:

- The center of the seawater intake array should be sited at 60 feet (ft) below mean sea level;
- A maximum seawater intake velocity of 0.5 feet per second (ft/s) should be maintained; and
- A monitoring plan, coordinated with and approved by NOAA Fisheries, should be established and implemented to measure the levels of mortality to marine fishery species (including ichthyoplankton) associated with the operation of the open rack vaporizer seawater intake.

Siting the seawater intake at a 60 ft depth would avoid the upper half of the water column where ichthyoplankton densities are highest, while also avoiding impacts to benthic and demersal species. Maintaining a maximum seawater intake velocity of 0.5 ft/s also minimizes the numbers of ichthyoplankton potentially entrained in the open rack vaporizer. If USCG and MARAD grant the deepwater port license, NOAA Fisheries would work with Port Pelican LLC to develop a monitoring plan that would ensure further protection of EFH and the associated marine fish species during the operation of Port Pelican.

Identifying Fishing Communities in the U. S. South Atlantic

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With the addition of National Standard 8 to the Magnuson-Stevens Act in 1996, fishery management councils must determine where fishing communities are and how dependent they are upon fishing. Initial research has been undertaken to complete the first requirement of that National Standard for the U.S. South Atlantic coast. This description of fishing communities for the South Atlantic Fishery Management Council includes a compilation of various social indicators that are relevant to fishing, fishermen and fishing communities. These data were put into a GIS and can now be combined with habitat and biological data to assess overall biological, economic and social impacts of council actions. This initial research provides important baseline data but also raises questions concerning the boundaries of communities and how to identify the diverse components of the recreational fishery that is important to fishing communities in the Southeast.

The Pollock Conservation Cooperative Research Center: North Pacific Fishing Industry Funds University Marine Research

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In December 1998, the seven Bering Sea pollock catcher/processor companies formed the Pollock Conservation Cooperative (PCC), a harvesting cooperative designed to rationalize the offshore midwater pollock fishery. Each year since then, the PCC has further resolved overcapacity in the fishery, continued to perfect catch monitoring and enforcement, retained and utilized 99.4% of all fish harvested, slowed the pace of the fishery by half to implement the management goal of dispersing pollock fishing over time and area, and enhanced the utilization of the fish caught by 35% over 1998.

In addition to achieving these advances in conservation and management, the PCC has a further goal of supporting marine research in the North Pacific and the Bering Sea. In February 2000, the PCC established the PCC Research Center with the School of Fisheries and Ocean Sciences of the University of Alaska Fairbanks.

Funded by annual contributions of $1 million from PCC member companies, the Research Center is administered by the School of Fisheries and Ocean Sciences. Proposals to the Center are evaluated by a Science Review Panel selected by the School of Fisheries and Ocean Sciences Dean, and prioritized by a six-member Advisory Board, which is comprised of two members representing the University, three members representing the PCC, and one member representing fisheries management agencies. The Dean of the School of Fisheries and Ocean Sciences reviews the Science Panel and Advisory Board recommendations and selects the projects to be funded.

The PCC Research Center provides: (1) grants and fellowships to faculty and graduate students for research on the fisheries, fish, and other species of the North Pacific and Bering Sea with an emphasis on pollock, other groundfish species, the fisheries for these species, and on marine mammals; (2) funding for marine education, technical training, and equipment; and (3) funding for research in the area of marine resource economics.

The PCC Research Center Board agrees on research priorities for each funding cycle, and for the 2004 awards the priorities are:

- The impact of fishing activities on the habitat of species of the Bering Sea and Aleutian Islands, and on the ability of that habitat to support diverse natural communities, with a particular emphasis on corals and sponges;
- Improvements in fishery stock assessment models;
- Improvements in the mitigation, sampling and identification of salmon bycatch in the fisheries;
- Pollock stock dynamics, and improved coordination in pollock management in the U.S. and Russia exclusive economic zones;

- The sustainability of the Northern fur seal and other marine mammals; and
- Assessment and reduction of interaction between fishing vessels and seabirds in the Bering Sea and Aleutian Islands.

Since its inception, the Center has funded 24 research projects, as well as a seafood technical training program at the University. Also, the PCC funds a research endowment at University of Alaska Fairbanks from which money will be available for marine research into perpetuity. Another percentage of the annual contribution goes into an endowment fund to establish a chair in oceans policy at the University of Alaska School of Fisheries and Ocean Sciences.

The Local Fisheries Knowledge Project and NOAA Fisheries' New LFK Database Tool

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Local and traditional fisheries knowledge research can be used to support fisheries science by providing biologists with information about species and habitat of common interest. Local fisheries knowledge (LFK), traditional fisheries knowledge (TFK), local environmental knowledge (LEK), and traditional environmental knowledge (TEK) are variant terms with slightly different meanings. Research on fishermens' traditional knowledge (TFK, TEK) has usually been carried out in the context of tribal people's use of fisheries and marine mammal resources, but all fishermen, especially those with long histories of fishing, have knowledge about fish and the marine environment (LFK, LEK). Fishermen often have extensive knowledge of species range, diet, behavior, habitat, and seasonal patterns, for instance. When studied and compared with existing fisheries science, this information can improve fisheries science and enhance resource management decisions. Comparative analysis of this kind of local or traditional knowledge with that produced by fisheries scientists can lead to testable hypotheses.

This poster describes the NOAA Fisheries Office of Science and Technology's Local Fisheries Knowledge Pilot Project currently underway in Hancock and Washington Counties, Maine. The pilot project is designed to be both an education and outreach project for high school students, and the vehicle for developing a new database tool that can be used in future scientific research that utilizes commercial and recreational fishermen's local fisheries and environmental knowledge. The Rural School and Community Trust is working directly with the Maine high schools during the pilot year to guide that part of the project, and NOAA Fisheries is developing the LFK Database, which will be housed on its internet servers in Silver Spring.

The new database tool is a web based, publicly accessible, searchable archive for LFK- and LEK-focused interview materials. It will also have the capability of content coding for a full range of fisheries-related social science topics, e.g., the cultural and social organization of fishing and the fishing industry, business aspects of fishing, fishing economics, fishery management and governance, etc. This new tool will allow fisheries scientists and others to conduct systematic analyses of narrative text content, once they are archived in the database. This is a first step in accessing LFK/LEK for scientific analysis in support of better management decisions. In the future, the database will include collaborative research conducted by professional social scientists, biologists and fishermen. It is part of the developing social science program at NOAA Fisheries.

Atlantic States Marine Fisheries Commission: Working Towards Healthy, Self-Sustaining Populations for all Atlantic Coast Fish Species or Successful Restoration Well in Progress by the Year 2015

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The Atlantic States Marine Fisheries Commission (The Commission) was formed by the 15 Atlantic coast states in 1942 in recognition that fish do not adhere to political boundaries. The Commission serves as a deliberative body, coordinating the conservation and management of the states' shared near shore fishery resources — marine, shell, and anadromous — for sustainable use.

Member states are Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. Each is represented by three Commissioners: the director for the state's marine fisheries management agency, a state legislator, and an individual representing fishery interests appointed by the governor. Commissioners participate in the deliberations in the Commission's five main policy arenas: Interstate fisheries management, research and statistics, habitat conservation, recreational fisheries, and law enforcement. The one-state one-vote concept allows Commissioners to address stakeholder-resource balance issues at the state level.

The Commission focuses on responsible stewardship of marine fisheries resources. It serves as a forum for the states to collectively address fisheries issues under the premise that as a group, using a cooperative approach, they can achieve more than they could as individuals. The Commission does not promote a particular state or a particular stakeholder sector.

The Commission's active management of 22 fish and shellfish species differentiates it from its Gulf and Pacific States counterparts. The Atlantic Coastal Fisheries Cooperative Management Act of 1993 formalizes this role and provides a mechanism to ensure compliance. The Act authorizes the Secretary of Commerce to pre-empt any state fishery not in compliance with a Commission approved fishery management plan.

Under the Atlantic Coastal Fisheries Cooperative Management Act and its predecessor, the Striped Bass Conservation and Management Act, the Commission along with its federal and Council partners have achieved some notable successes. These include recovery of Atlantic striped bass and weakfish populations as well as continued rebuilding of summer flounder, black sea bass, bluefish, and red drum stocks.

Looking forward, the Commission seeks to expand its effectiveness through continued partnerships with the federal agencies and the three Atlantic Fishery Management Councils in pursuit of its Vision: ...of healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015. For more information about the Commission, please visit our website at www.asmfc.org.

Descriptive Overview of the North Pacific Halibut and Sablefish IFQ Program

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Fishing under the North Pacific Halibut and Sablefish Individual Fishing Quota Program commenced in the spring of 1995. The program was recommended by the North Pacific Fishery Management Council to address the problems associated with significantly overcapitalized fixed-gear fisheries (e.g., short seasons, declining Catch Per Unit Effort, grounds preemption and lost gear, high bycatch mortality, poor product quality, poor safety, unstable markets, and low ex-vessel prices). Following an application process, Quota Shares (QS) were awarded to persons with historic landings on vessels they owned or leased during the mid 1980s through 1990. QS are identified by species, area, vessel size and use category, and additional characteristics. Upon approval of an application to NMFS, QS may be transferred to eligible recipients. Program rules prevent foreign or excessive share accumulation and over-consolidation of participants and vessels, authorize some persons to hire masters, or require that the owner be on board.

Harvest privileges (derived from annual Total Allowable Catch amounts) are distributed to QS holders proportional to the amount of QS they hold for each species and administrative area. The distribution (an Individual Fishing Quota permit for that year) includes administrative adjustments from under- or over-fishing from the preceding year. Serious over-fishing results in fish confiscation at the time of landing and, in some situations, prosecution.

The program is considered a "success" by many observers. The negative effects of overcapitalization have been partially mitigated, or eliminated, and program goals are seen to have been accomplished. However, consolidation has reduced the number of participants and vessels, with concomitant effects on fishery-dependent communities and short-term crew employment.

The poster will explain the program and provide data on its performance.

IFQ Cost Recovery Program

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The 1996 Sustainable Fisheries Act mandated that NMFS recover the costs of managing and enforcing IFQ programs. In the Alaska halibut and sablefish program (the only one for which this mandate has been implemented), this is accomplished by annually calculating those costs, determining ex-vessel values, and billing IFQ permit holders who exercised their harvest privilege.

Since the inception of the Cost Recovery effort, permit holders have actively cooperated with this program (the payment rate exceeds 99%). Not all receipts are used for the IFQ program, however. Fully 25% of the recovered monies are deposited in the Treasury and may be appropriated to support the North Pacific (IFQ) Loan Program (managed by the NMFS Financial Services Branch on behalf of "entry level fishermen" and "fishermen who fish from small vessels").

The poster will provide a description of the elements and of the Cost Recovery Program, as well as an explanation of how it has been implemented, and funds collected.

Electronic Reporting in the North Pacific Halibut and Sablefish IFQ Program

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Management programs that require timely enforcement, account management, and biological landings sampling are best supported by real-time reporting programs. Such programs also decrease data entry and transcription errors and provide real-time secure account management and access to account and vessel balances, printed receipts, and messaging.

In the Alaskan IFQ program, vessel operators must hail in prior to offloading IFQ fish, and Registered Buyers must report landings electronically via automated transaction terminals (ATM) and swipe cards or the Internet, within six hours of the offload. Real-time messaging enables selectivity for observers and for dockside enforcement activities such as fish confiscations.

ATM technology has been very successful in Alaska for nine years. ATMs are a lower technology, and may be more suitable for use in remote locations. However, ATM reporting is slower and more cumbersome for users, hardware is expensive for Government to purchase and maintain, and the technology and equipment rapidly becomes obsolete. The Internet system is more user-friendly and intuitive, can make use of wireless technology for at-sea locations and where land-based services are primitive or lacking, and can be expanded by NMFS to provide additional user options only practical on systems with sufficient viewing interfaces.

The poster will explain the reporting requirements and the reporting options available to permit holders in the IFQ program, and will summarize use data.

The Alaska Subsistence Halibut Program

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Since recorded time, Natives and other rural Alaskans have depended on the harvest of Pacific halibut to partially satisfy their subsistence (nutritional, cultural, spiritual, and social) needs. As the commercial and sport halibut fisheries were developed throughout the twentieth century, a complex management structure was established. However, that structure did not include recognition of subsistence uses of the halibut.

In October 2000, the North Pacific Fishery Management Council approved a program to recognize and codify the subsistence use of halibut by Native and rural Alaskans. The program authorizes subsistence harvest of halibut for "non-commercial, customary and traditional uses," and extends eligibility to participate in the fishery to residents of coastal rural communities and members of Alaska Native Tribes that have been determined to have a history of subsistence use of halibut. Eligible individuals are required to register for the fishery in a simple process managed by the NMFS Restricted Access Management Program (as of mid-September 2003, approximately 11,000 individuals have registered).

Special, more "liberal" (as compared with either commercial or sport fisheries) harvest guidelines apply to the subsistence fishery. For example, the subsistence fishery is open year-round, while the commercial fishery is limited to 8 1/2 months and the sport fishery is limited to 10 months. Additionally, subsistence fishers may use long-line skates (prohibited to sport fishers) and may retain up to 20 halibut per day (as opposed to two per day for sport fishers). Four areas in the waters off Alaska are closed to subsistence halibut fishing because of their proximity to urban centers; other closed areas include Glacier Bay National Park and Preserve and a small area near Sitka. Subsistence harvests will be monitored post-season using voluntary surveys conducted under contract by the Subsistence Division of the Alaska Department of Fish and Game.

The poster will explain the elements of the subsistence provisions, provide information on their implementation, and discuss refinements to the program proposed by the Council.

For the Birds: The Mingled Destinies of Seabirds and Longliners in the North Pacific

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In the fall of 1995 two short-tailed albatrosses were taken on the baited hooks of freezer-longliners fishing for groundfish off Alaska. The birds had been hunted relentlessly during the 19th and 20th centuries, and by 1949 were thought to be extinct. In 1950 about 10 nesting pairs were discovered on Torishima, a highly active volcanic island south of Japan (where 80% of the breeding population now nests). By 1995 there were some 900 short-tails (today 1,840), a highly endangered seabird species, the only one in the North Pacific listed as such under the Endangered Species Act.

The significance of these takes was not lost on the longline industry or the environmental community. It was obvious that immediate action was necessary. The North Pacific Longline Association undertook a study of longline/seabird interaction problems worldwide, and came across regulations which required the use of seabird avoidance techniques on longliners in Antarctic waters. Using these as a model, the industry drafted a set of seabird avoidance regulations for longliners fishing in the North Pacific. These were adopted by the North Pacific Fishery Management Council in December of 1996, and were implemented in May of 1997. Industry made it clear that these regulations were a "best first shot" at seabird avoidance, and that they would be improved through experience.

The U.S. Fish and Wildlife Service (the expert agency), having jurisdiction over the albatrosses under the Endangered Species Act, then wrote a biological opinion requiring that the National Marine Fisheries Service (NMFS, the action agency with jurisdiction over the fisheries) conduct research to assess the effectiveness of the measures contained in the regulations. NMFS had budgeted no funds for the required work, and here began a remarkable cooperative effort by industry and the Washington Sea Grant Program, later joined by U.S. Fish and Wildlife Service, NMFS, the Coast Guard, and the North Pacific Fishery Management Council, to raise the necessary funding, conduct the required research, and revise the regulations. (See Melvin and Parrish, "Focusing and Testing Fisher Know-How to Solve Conservation Problems: A Common Sense Approach," Putting Fishers' Knowledge to Work: Conference Proceedings, Page 244.)

Seabird interactions with longline gear are extremely rare. In order to achieve statistical robustness it was necessary to design a protocol involving the setting of millions of hooks from longliners engaged in their usual commercial fisheries (something that had never been done previously). Special observers were trained to document seabird interactions with different avoidance technologies. The experiments were conducted

over a period of two years (1999 & 2000). The results indicated that paired streamer lines of specified performance and material standards were 88-100% effective in reducing seabird takes. For that reason the North Pacific Fishery Management Council adopted, and NMFS will soon promulgate, regulations requiring the deployment of streamer lines whenever baited hooks are being set. Paired streamer lines are now required on longliners fishing off British Columbia, Canada, and are being tested in longline fisheries worldwide.

In the five years since implementation of the first seabird avoidance regulations (1997 to 2002) the freezer-longliner fleet, which takes some 85% of the seabirds taken in the Bering Sea/Aleutian Islands Area, reduced its incidental take by 85% (note that there have been only seven confirmed observed takes of short-tailed albatrosses, the last occurring in 1998). However, during our research we learned that there is considerable interannual variation in the number of seabird strikes experienced — probably because of natural variations in the abundance and location of food. The incidental take rate has increased in 2003, though not to biologically significant numbers. During 2004 we will test internally weighted groundlines which sink the baited hooks two to three times faster than unweighted groundlines, and offer great promise not only for seabird avoidance but for increased fishery catch rates.

Aside from interannual variability in seabird interactions, the research revealed that bird takes do not usually involve the bird swallowing the baited hook, as was previously assumed — the birds are usually hooked in the breast or wing as they attack the baits.

Finally, the North Pacific Longline Association and the Marine Conservation Alliance have petitioned Congress for an appropriation to fund the work of the Short-Tailed Albatross Recovery Team. A major goal of the team is to establish two breeding colonies on non-volcanic islands, and eventually delist the birds under the Endangered Species Act.

The Marine Conservation Alliance

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The Marine Conservation Alliance was established in 2001 by fishing associations, communities, Community Development Quota groups, harvesters, processors, and support sector businesses, to promote the sustainable use of North Pacific marine resources by present and future generations, based on sound science, prudent management, and a transparent, open public process. We seek practical solutions to resource use questions to both protect the marine environment and minimize impacts on the North Pacific fishing community. We support research and public education about the fishery resources of the North Pacific. We pursue these goals through six major avenues:

1. Regulatory Action.
The Marine Conservation Alliance works to continue and expand the diligent, responsible practices that make the North Pacific groundfish fishery the best-managed fishery in the world through:

- Science-based management decisions;
- Conservative fishing quotas;
- Effective monitoring and enforcement;
- Rationalization of effort;
- Protection of fisheries-dependent communities;
- Incorporation of ecosystem-based management principles into Fishery Management Plans;
- Maintaining an open, transparent public process where all stakeholders can participate; and
- Recognizing the North Pacific as a sustainable source of wholesome, nutritious, high-quality seafood.

2. Sound Science Supports Smart Management.
We advocate continued, expanded, and ongoing basic peer-reviewed research and applied, cooperative research involving partnerships between resource user groups and government managers, including the on-board observer program, vessels as research platforms, and collection and use of real-time data from the fisheries. Marine Conservation Alliance members presently support a wide variety of research efforts, including the Pollock Conservation Cooperative Research Center and the North Pacific Marine Research Foundation.

3. Reduce Bycatch and Bycatch Mortality.
Because rationalization eliminates the "race for fish," reduces bycatch, improves safety, and results in delivery of higher quality products, the Marine Conservation Alliance generally supports quota-based rationalized fishing systems. We encourage ongoing funding for conservation efforts, and advocate experimental approaches to solving both nationwide and regional challenges, especially partnerships between industry, the regional fishery management councils, government, and academia.

4. Foster Science, Avoid Litigation.
The increasing prevalence of litigation hampers the ability of government agencies to do their regular work, and creates a massive drain on energy and resources of all parties. The Marine Conservation Alliance seeks non-litigious solutions to both protect marine resources and the fisheries and communities that depend on them, using the same transparent, public, science-driven process central to Council decisions.

5. Minimize Pollution and Contaminants.
Pure water, healthy ecosystems, wholesome seafood, steady jobs, and livable communities are inextricably related. The long-term health of our fisheries depends on minimizing pollution and contaminant threats, from sources as diverse as industrial and commercial activities, port development, navigation threats, agriculture, silviculture, aquaculture, urban and suburban development, erosion, mining, logging, dumping, and natural events.

6. Remove Marine Debris.
The Marine Conservation Alliance is building a new, cooperative program to identify, collect, transport, and dispose of marine debris, including derelict fishing gear.

For more information, see www.marineconservationalliance.org.

The Magnuson-Stevens Act: A Lighthouse for Fishery Management

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The Magnuson-Stevens Fishery Conservation and Management Conservation Act, like a lighthouse, provides North Pacific Managers with the tools needed to stay clear of the rocks of unsustainable practices. For over a quarter of a century, the Magnuson-Stevens Act has provided the framework for the most successful fishery management process in the world by providing flexible management regimes where:

- Change is the only constant;
- New science and information drives changes in management approaches; and
- Recommendations and initial decisions are made at the local level — by those most informed and qualified — and final decisions are made at the federal level by those responsible for the outcome.

Although the Magnuson-Stevens Act enables an excellent fishery management system, it undergoes periodic improvements. The Magnuson-Stevens Act's regional approach is critical to successful management, and early on, the North Pacific Fishery Management Council established a conservative management process coordinated by local, state, and regional managers, based on the following principles:

1. Open and Transparent Regulatory Process.
Extensive public testimony, public deliberation, and a thorough committee process enable participation by all stakeholders. The North Pacific Fishery Management Council follows comprehensive scientific advice from a panel of fifteen scientists, facilitating science-based management decisions and sustainable fishing quotas.

2. Sustainable and Conservative Fishing Quotas.
The North Pacific Fishery Management Council sets harvest limits at or below sustainable levels defined by fishery scientists. Third-party observers monitor quotas. Eleven Bering Sea and Aleutian Island groundfish fisheries operate under an overall two million metric ton harvest cap, which includes both targeted and non-target species. After over 25 years, not a single North Pacific groundfish species has been overfished.

3. Effective Monitoring and Enforcement.
The majority of the harvest is observed constantly by federally mandated and trained observers, paid for by the industry and aboard harvesting vessels, processing vessels, and catcher-processor vessels, and in shoreside processing plants. A mandatory Vessel Monitoring System assists enforcement.

4. Effective Limitations on Fishing Effort.
Since 1999, the Bering Sea pollock fishery — the nation's largest fishery — has operated entirely under a cooperative management regime. Vessels are allocated a percentage of the catch and each harvests at its own pace. License Limitation Programs mitigate overcapitalization in other fisheries.

5. Ecosystem-Based Management Principles.
The North Pacific Fishery Management Council considers ecosystem impacts of management decisions. Fishery closures, by time, area, and gear type, account for species vulnerability at certain life stages, sea floor habitat values, and reproductive requirements. Some 130,000 square nautical miles of the North Pacific are closed or restricted.

6. Protection of Fishery Dependent Communities.
Coastal communities depend on ocean resources, and MSA-managed North Pacific fisheries have met the commercial and subsistence needs of rural Alaskans. The foundations of both the Community Development Quota (CDQ) Program and non-CDQ communities are built solidly upon sustainably managed ocean resources. Coastal Alaska could not survive without wisely managed ocean resources.

By any measure, the North Pacific example proves the Magnuson-Stevens Act provides the framework to manage fishery resources successfully.

North Pacific Bycatch Management

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The Sustainable Fisheries Act defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use." This includes both fish discarded because they are not economical to keep ("economic discards") and fish discarded because it is illegal to keep them ("regulatory discards"). Incidental catch kept and utilized does not count as bycatch. National Standard 9 of the Sustainable Fisheries Act states "Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." The Congressional Record clarified further: " 'Practicable' requires an analysis of the cost of imposing a management action; the Congress does not intend that this provision will be used to allocate among fishing gear groups, nor to impose costs on fishermen and processors that cannot reasonably be met."

In the North Pacific, all fish harvested count towards the quotas. Bycatch is not a biological concern in most fisheries; rather it is an allocative concern between fisheries.

Successful bycatch management requires:
1. Accurate monitoring and reporting of the harvest, discards and processing;
2. Accounting for all harvests, whether retained or discarded;
3. Incentives for bycatch reduction and avoidance; and
4. Tools to facilitate bycatch reduction and avoidance.

Numbers 1-3 are already in place in the North Pacific, while item number 4 is still being developed through rationalization.

The North Pacific Fishery Management Council has introduced numerous actions to limit and reduce bycatch, with varying degrees of success. Prohibited species caps limit the absolute amount of catch, but create a "race for bycatch." Maximum Retainable Allowances allow vessels to keep some incidental catch

when fisheries are closed, while discouraging targeting of those species. Improved Retention/Improved Utilization regulations have eliminated bycatch in the pollock, Pacific cod and shallow water flatfish fisheries except when those fisheries are closed. The fishing industry has significantly reduced economic discards through gear modifications, market development and fishing tactics.

Some bycatch reduction efforts, such as 100% retention of flatfish, have been disapproved because they do not meet the 'practicability' standard. In open-access fisheries, forcing retention of unmarketable fish is extremely expensive and has no benefit to the Nation or the stocks. However, as fisheries are rationalized, vessels can then increase the value of their individual catch by minimizing their individual bycatch. Requiring increased retention becomes more "practicable" when fishermen are given this tool.

All fisheries have some bycatch. By giving fishermen both the incentive and the tools to minimize bycatch, the North Pacific Fishery Management Council continues to increase the value of the fisheries and to minimize discards. Rationalization makes increased retention more practicable, and enables fishermen to maximize the value from each fish landed.

Marine Research in the North Pacific

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The single best way to improve management of the North Pacific ecosystem is to expand the base of reliable information about how that ecosystem works. From meteorological data to baseline understanding of marine habitats and the life those habitats support, we need continued, expanded, and ongoing basic peer-reviewed research to better understand this complex ecosystem. As the Magnuson-Stevens Fishery Conservation and Management Act's National Standards recognize by statutorily requiring management decisions be based on "best available science," good management decisions require good science.

The Marine Conservation Alliance advocates improving scientific understanding through:

- Increasing government agency research budgets;
- Increasing private support for research;
- Publicizing important projects and new discoveries; and
- Building new collaborations among interested groups to further research;

Marine Conservation Alliance sponsors presently support a wide variety of research efforts and plan to do even more in the future. For example, over the past four years, the seven member companies of the Pollock Conservation Cooperative have collectively contributed $5 million to sponsor 25 marine research projects and an endowed chair in fisheries research at the School of Fisheries and Ocean Sciences at the University of Alaska, and to Alaska Pacific University and Sheldon Jackson College. MCA members also support initiatives such as the North Pacific Marine Science Foundation, which helped fund groundbreaking research into the nature and cause of the decline of Steller sea lions in the North Pacific.

The Marine Conservation Alliance supports applied, cooperative research involving partnerships between resource user groups and government managers. This includes making vessels available as research platforms and industry-sponsored programs for collection and use of real-time data from the fisheries. An example of the latter is the Bering Sea pollock fleet's Salmon Bycatch Reduction and Avoidance program, whereby real-time salmon bycatch "hotspot" information is collected and distributed to the active fleet on the fishing grounds.

Healthy Marine Habitat: The Foundation of North Pacific Fisheries

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No one is more concerned with the long-term health of the North Pacific and its vast and diverse resources than the people whose lives and livelihoods depend on them. The Marine Conservation Alliance wants and believes we can have clean water, sustainable fisheries, good jobs, and prosperous, livable coastal communities. The cornerstone of all those goals is healthy marine habitat that maintains the sustainability of the managed species.

The North Pacific Fishery Management Council and stakeholders in the region have engaged in serious study and deliberation to identify and protect Essential Fish Habitat and to designate criteria and a process to identify Habitat Areas of Particular Concern. The purpose of these designations is to better understand managed species' interaction with and reliance on their habitats. Mitigation measures to afford additional habitat protections may be implemented if impacts of fishing gear are demonstrated to have more than temporary and more than minimal effects on the managed species, and those measures are determined to be praticable.

Significant habitat protections exist in the North Pacific. One hundred thirty thousand square nautical miles — an area larger than the state of Indiana — are already closed to some or all fishing gear, including:

- Bottom Trawl Restrictions in State Waters, State Critical Habitat Areas, and State Marine Parks;
- Catcher Vessel Operational Area;
- Pribilof Islands Savings Area;
- Herring Savings Areas;
- Prohibited Species Bycatch Limitation Zones;
- Crab and Halibut Protection Zones;
- Chum Salmon Savings Area;
- Pribilof Islands Habitat Conservation Area;
- Steller Sea Lion Critical Habitat Protection Areas;
- 3 Nautical Mile No Transit Zones Around Steller Sea Lion Rookeries;
- Pollock and Cod No Trawl Zones;
- Atka Mackerel No Trawl Zones;
- Nearshore Bristol Bay Closure Area;
- Bristol Bay Red King Crab Savings Area;
- Walrus Islands Closures;
- Chinook Salmon Savings Areas;
- Cape Edgecumbe Pinnacles Reserve;
- Bogoslof Groundfish Closure Area;
- Alaska Coastal Management Plan Areas Meriting Special Attention;
- Southeast Alaska Dive Fishery Closures; and
- Southeast Trawl Closure in the Gulf of Alaska.

Closures, restrictions, and MPAs can serve legitimate management objectives if they are scientifically justified, have clearly articulated goals, and incorporate provisions for continued monitoring to ensure those goals are being achieved.

Protected Species Management in the North Pacific

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In the North Pacific, managers and users alike enjoy a wealth of solid biological information about marine resources, which indicates those resources are in good health. The National Marine Fisheries Service (NMFS) shows no North Pacific groundfish stocks are overfished, and the complex as a whole is in excellent condition relative to historic levels. Some crab stocks are cyclically depressed, and the Steller sea lion population has substantially decreased since the 1970s. Scientists have not yet determined the causes of these declines, yet significant fisheries restrictions have been implemented to protect these species.

Compared to many other areas on the globe, the North Pacific is better understood and better managed. Still, as more sophisticated methods of collecting and analyzing data are developed, stakeholders will better understand complex interrelationships of marine organisms and their habitats, and will surely refine an already adequate system of management.

The depressed crab stocks are under rebuilding plans, as required by the Magnuson-Stevens Fishery Conservation and Management Act, with several crab fisheries closed to allow for growth. The western stock of Steller sea lions has received increased protection and research attention in the last five years, with $40 million allocated for research in 2001, much of which is producing useful results. After extensive consultations with NMFS, the North Pacific Fishery Management Council established a committee of stakeholders, environmentalists, and scientists to recommend sea lion protective measures for the Bering Sea and Aleutians and the Gulf of Alaska. The committee met for 25 days over the first six months of 2001, and sent to the Council an extensive suite of fishery management measures to provide additional protection for sea lions. Following North Pacific Fishery Management Council adoption, NMFS approved the measures, which remain in place two years later. Restrictions on the pollock, cod, and Atka mackerel fisheries are providing significant and effective protection, enabling NMFS to find that the groundfish fisheries are neither jeopardizing Steller sea lions nor adversely affecting critical habitat.

The Marine Conservation Alliance supports rationalized fishing systems to achieve significant conservation and economic benefits, including improved fleet safety, bycatch reduction, and delivery of higher quality products. Participants in rationalized fisheries can better adapt to the restrictive measures needed for protected species. Other steps can reduce incidental catch and associated mortality. A notable example is the North Pacific Longline Association's effort to avoid incidental catch of seabirds. This industry initiative, taken under the auspices of the North Pacific Fishery Management Council, in partnership with government and academia, is an excellent example of the teamwork and practical approaches to problem solving supported by the Marine Conservation Alliance.

Ecosystem-Based Fishery Management in the North Pacific

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Ecosystem considerations are incorporated into the full range of fishery management measures employed in the North Pacific. The National Research Council (NRC), an arm of the National Academy of Sciences, identified management strategies that fish managers should employ to ensure a sustainable ecosystem. The goal was to "rebuild and sustain populations, species, biological diversity, so as not to jeopardize a wide range of goods and services from marine ecosystems, while providing food, revenue and recreation for humans."

The NRC made eight specific management recommendations in its report. In every instance, fishery management techniques used in the North Pacific meet or exceed the recommended measures. Not a single groundfish stock is overfished in the North Pacific demonstrating that federal fishery management does not need to be overhauled in order to sustain the marine resource. Those NRC recommendations include:

- *Adopt conservative harvest levels and set annual catch limits.* Annual catch limits for the North Pacific fisheries are set at or below the acceptable biological catch (ABC) level recommended by fishery scientists. Annual catch limits are set for each groundfish species, and fisheries close when catch limits are reached. A federal observer program, funded by the industry, monitors and reports catch and bycatch amounts which count against the limit.

- *Incorporate ecosystem-based goals into management*. Ecosystem considerations are incorporated into the North Pacific annual stock assessment reports which include the development of stock assessment models that factor in uncertainty of population dynamics. Also included are biodiversity and regime shift indicators designed to reveal changing ecosystem trends not yet understood which could affect stock abundance.

- *Adopt a precautionary approach to deal with uncertainty*. Fishery scientists and managers use a precautionary approach to estimate fish abundance when setting catch limits. An overall species harvest cap in both the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) is always lower than the cumulative, biological catch limits for individual species.

- *Reduce excess fishing capacity and assign fishing rights*. In recent years efforts have accelerated to reduce excess capacity in the North Pacific and end the "race for fish." In recent years action has been taken to "rationalize" the halibut, sablefish, and BSAI pollock and crab fisheries. The Council is now deliberating over complex programs that seek to establish rights-based management in all GOA groundfish and BSAI non-pollock groundfish fisheries.

- *Establish Marine Protected Areas as a buffer for uncertainty*. Managers have established a comprehensive habitat protection policy. Approximately 130,000 square miles of productive fishing grounds, an area larger than the state of Indiana, are closed permanently or seasonally to some or all fishing to protect marine resources and sensitive habitat.

- *Include bycatch and discard mortality in catch accounting*. North Pacific managers have implemented numerous measures to reduce bycatch and to ensure an accurate accounting of bycatch. In all cases, bycatch-related mortality is included in catch accounting.

- *Institutionalize scientific and stakeholder review into a transparent decision making process*. As part of the North Pacific Fishery Management Council process, the Scientific and Statistical Committee (SSC) meet during each Council session and make recommendations on stock-assessment, ecosystem, habitat and economic models. In more than 20 years the Council has never overturned recommendations made by the SSC when setting catch limits. Members of the environmental, commercial and sport fishing sectors and Alaska Natives serve on its advisory panel. Appointed committees, including an Ecosystem Committee, make recommendations to the Council. All meetings are open to the public and public comment is solicited on all proposed management measures.

- *Conduct more research on structure and function of marine ecosystems*. NMFS regularly incorporates uncertainty into stock assessment models and engages in research to increase its understanding of prey/predator relationships, climate and oceanographic shifts and habitat mapping and impact assessment. Industry supplements this research with about $2 million in annual contributions to university marine research.

Rationalized Fisheries in the North Pacific

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Rationalized, individual quota-based fishing systems bring significant conservation and other benefits, ranging from bycatch reduction and delivery of a higher quality product. Rationalization improves the fleet's safety by eliminating the "race for fish." As with all conservation and allocation decisions, the authority to create and implement quota-based or cooperative rationalization systems should reside with the regional councils created by the Magnuson-Stevens Fishery Conservation and Management Act.

Rationalization schemes as put forth by the North Pacific Fishery Management Council and Congress have succeeded in reducing overcapitalization in specific fisheries. For example, since 1999, fishery effort limitation in the Bering Sea pollock fishery — the Nation's largest fishery — has resulted in the entire fishery operating under a cooperative management regime. Vessels are allocated a percentage of the catch and each harvests at its own pace. In other fisheries, License Limitation Programs mitigate overcapitalization.

Each of these rationalization schemes has been carefully tailored to the fishery in question, and in pursuing the overall goal of matching fishing fleet capacity with the characteristics and tolerances of the marine resources they pursue, these schemes have done well at achieving their goals:

- Reducing overcapitalization;
- Ending the race for fish;
- Reducing bycatch and discards;

- Increasing yield and product quality;
- Spreading fisheries out both temporally and spatially to protect endangered species;
- Better meeting the product specification needs of American consumers; and
- Reducing National Marine Fisheries Service management and enforcement costs.

Sustainable Fisheries, Healthy Communities: Benefits of North Pacific Fisheries

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Rural coastal communities across Alaska share many common characteristics that set them apart from rural communities in other parts of the country, including:

- A lack of road systems places the burden of transportation of people and goods heavily on airplanes and vessels, both of which are subject to weather;
- Transportation costs that highly inflate prices of goods throughout rural Alaska, especially in northern communities that lose their ocean access to ice for half the year; and
- A shortage of modern conveniences taken for granted by most Americans, including sewer systems, running water, and proper solid waste disposal.

However, probably the most important common trait seen across these communities is their dependence on well-managed ocean resources. Both subsistence and commercial fisheries rely heavily on proper guidance from resource managers.

A notable success story is how the well-managed fisheries of the North Pacific, under the auspices of the Magnuson-Stevens Fishery Conservation and Management Act, have met the needs of the residents of rural Alaskan communities. From the Community Development Quota (CDQ) Program, in which six groups representing 65 fishing communities are actually allocated a portion of the groundfish and crab fisheries from which they derive many employment opportunities and broad economic growth, to other non-CDQ coastal communities whose foundations are built solidly upon commercial fishing, coastal Alaska could not survive without sustainable use of wisely-managed ocean resources.

Allocations to CDQ groups, facilitated through the Magnuson-Stevens Act, have boosted the economies of their communities and subsequently the standard of living for their residents in many ways, including:

- Creation of employment opportunities (CDQ groups are the largest private employers in most of Western Alaska);
- Development of fishing infrastructure (e.g., processing plants, harvesting vessels);
- Development and support of regional commercial and subsistence fisheries;
- Provision of fisheries quota for regional residents to harvest;
- Establishment of educational, training, and scholarship programs;
- Research and development of new and existing fisheries; and
- Investments in Bering Sea fishing companies.

From 1993-2002, CDQ groups in total have facilitated over $82 million in wages and over $12 million in training to over 9,400 residents of the CDQ communities.

Many non-CDQ communities are heavily dependent on fisheries managed under the Magnuson-Stevens Act. For example, in Unalaska/Dutch Harbor (the nation's leading fishing port for the fourteenth consecutive year), the economy relies on the fishing industry for both public and private sector services, including fishing income, fuel sales, equipment and supply sales, onshore processing, vessel servicing, logistical support, vehicle rentals, and local and state taxes.

In 2002 alone, Unalaska/Dutch Harbor fisheries businesses and services contributed over $35 million in state and local taxes. Overall, the community has seen over $300 million invested locally by the seafood industry — all a direct result of sustainably managed North Pacific fishery resources. In addition, Kodiak

and other Alaska communities are regularly named as among the top ten fishing ports of the nation. This wealth of groundfish, salmon, crab, and shellfish drives the economic engine of coastal Alaska and produces 50% of all seafood in the United States.

Gear Technology and Information in North Pacific Bycatch Management

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The Marine Conservation Alliance supports applied, cooperative research involving partnerships between resource user groups and government managers. This includes making vessels available as research platforms and industry-sponsored programs for collection and use of real-time data from the fisheries. An example of the latter is the Bering Sea pollock fleet's Salmon Reduction and Avoidance program, whereby real-time salmon bycatch "hotspot" information is collected and distributed to the active fleet on the fishing grounds.

Private technology-based companies such as Sea State, Inc. now offer sophisticated software and other computer-based technology to the industry that enables vessels and fleets to identify areas of high bycatch (e.g., of salmon or halibut) on a real-time basis so subscribers can redirect their fishing efforts to areas where bycatch is not a problem. The availability of such technology has enabled the various fleets to organize successful bycatch avoidance programs that have reduced the bycatch rates of salmon, halibut, and crab significantly over the past five years.

The Marine Conservation Alliance and its sponsor organizations are engaged in an active research and development program to design, test, and deploy trawl gear capable of excluding, removing, or otherwise avoiding salmon and other species bycatch. At press time, a new prototype was being tested in the field; results should be available later this fall.

Incidental, inadvertent catch of seabirds, especially the endangered short-tailed albatross, can have enormous regulatory impact on fisheries. The North Pacific Longline Association studied the problem worldwide, and developed seabird avoidance regulations, which were adopted by the North Pacific Fishery Management Council. Experiments showed paired streamer lines were 88-100% effective in reducing seabird takes; regulations requiring deployment of streamer lines are being promulgated.

In the five years since the first seabird avoidance regulations were enacted, the freezer-longliner fleet — previously responsible for 85% of the seabirds taken in the Bering Sea/Aleutian Islands — reduced its incidental take by 85%. Future experiments to further reduce seabird take will involve internally weighted groundlines. The North Pacific Longline Association and the Marine Conservation Alliance have petitioned Congress for an appropriation to fund the work of the Short-Tailed Albatross Recovery Team to establish two new breeding colonies on non-volcanic islands, and eventually delist the birds under the Endangered Species Act. Now, in cooperation with the U.S. Fish and Wildlife Service, the Marine Conservation Alliance is working to identify new technology to help trawl fishermen avoid seabird entanglement in so-called "third wire" gear.

The Marine Conservation Alliance's Marine Debris Cleanup Program

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Persistent debris in the ocean is a serious, growing environmental problem. Wildlife become entangled in or ingest dangerous materials with frequently fatal results. Every year, more knots of cargo vessel netting, rope, plastic binding straps, nets, fishing line, buoys, plastic baskets, and bottles wash up on beaches throughout the world.

In 2002 and 2003, the Marine Conservation Alliance learned firsthand the size of the marine debris problem by helping with beach cleanup projects on St. Paul Island in the Bering Sea. In a coordinated effort, the Marine Conservation Alliance and the Aleut Community of St. Paul Island Tribal Government's Ecosystem Conservation Office disposed of more than seventeen tons of derelict fishing gear, plastic debris, and other litter collected from the island's shores by local volunteers. The material was transferred to steel containers, loaded on a barge, and shipped to Unalaska/Dutch Harbor for disposal. Meanwhile, about 20 local workers and other volunteers collected an estimated 80-90 tons of additional debris in the 2003 annual St. Paul Island beach cleanup. There is continuing work to be done at St. Paul Island, and an unfathomably enormous cleanup job remains to be started on Alaska's 47,000 miles of shoreline.

The Marine Conservation Alliance has taken the first steps toward a large-scale, comprehensive marine debris cleanup. Beyond continuing to assist with actual beach cleanups, Marine Conservation Alliance's plans for the future include:

- Working with communities to help fund the disposal of debris collected locally;
- Coordinating recycling and/or proper disposal of debris collected;
- Coordinating the volunteers aboard the fishing vessels of Marine Conservation Alliance sponsor companies to provide transportation services on available vessels of appropriate size when debris is identified as ready for transport;
- Investigating innovative technological options for recycling marine debris;
- Forming a separate Marine Conservation Alliance Foundation as a non-profit organization under IRS Code 501(c)(3) to seek and administer grants and tax-deductible contributions to help fund the marine debris cleanup program;
- Providing forms on the Marine Conservation Alliance website for reporting sightings of marine debris; and
- Providing regularly updated reports on the Marine Conservation Alliance website showing locations of debris sightings.

The Marine Conservation Alliance was established in 2001 by fishing associations, communities, CDQ groups, harvesters, processors, and support sector businesses, to promote the sustainable use of North Pacific marine resources by present and future generations, based on sound science, prudent management, and a transparent, open public process. We seek practical solutions to resource use questions to both protect the marine environment and minimize impacts on the North Pacific fishing community. The Marine Conservation Alliance supports research and public education about the fishery resources of the North Pacific.

Cooperative Research and Fisheries Science and Management in New England: Attitudes and Opinions from the Commercial Fishing Industry

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Cooperative research seeks to promote partnerships between fishers and researchers to advance our understanding of the marine and fisheries sciences and provide meaningful, high quality information to managers, educators, fishers, and the science communities. The success of cooperative research, at least in part, depends upon the commercial fishing industry's willingness to be actively engaged in the research process, including the design, data collection and analysis, reporting, and application of the research findings. There are many potential barriers to cooperative research and very little empirical research on the social or human dimensions of this topic. This poster seeks to provide a preliminary understanding of what members of the commercial fishing industry in New England know and think about cooperative research and fisheries science and management. We present the results from the initial stages of a comprehensive study of cooperative research from a mail survey (n=295) of active participants in the commercial fishing industry. The survey respondents were a highly engaged subset of active fishermen, with over half engaging in the fisheries management decision-making process (i.e., attending Council meetings, contributing money to fishing-related causes, calling or writing government representatives, and commenting on fishery management plans). Among this group, there was a high degree of support and

willingness to participate in cooperative research and a strong belief that cooperative research is making a difference in fisheries management and fishing communities. For example:

- 95% believe cooperative research is important;
- 88% believe cooperative research will lead to better management decisions;
- 86% believe cooperative research will improve relationships between fishermen and scientists;
- 80% believe cooperative research is a good investment of federal dollars; and
- 77% believe cooperative research provides economic benefits to fishing communities.

However, a closer look at these fishermen's attitudes demonstrates a bifurcation of support and attitudes between National Marine Fisheries Service (NMFS) scientists and university-based scientists. For example:

- 70% respect university or academic scientists, whereas 30% respect NMFS scientists; and
- 55% trust university scientists more than NMFS scientists.

In spite of these obstacles, these fishermen know that they can learn from scientists and that scientists can learn from them (89%). While many of the responding fishermen do not believe university-based scientists (60%) or NMFS scientists (75%) have the necessary understanding to collect fishery management-relevant data, they feel they have knowledge and experience important to fishery management and policy (88%).

Therefore, while the underlying trust and respect between fishermen and scientists may not be strong, the attitudes toward cooperative research, the belief that it makes a difference and the incentives for participating are significant. There remain strong interests and motives to participate in cooperative research. The time is right for more and successful cooperative research ventures.

Using GIS on Fishery-Independent Survey Data to Develop Ecosystem-Based Fishery Management

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The South Carolina Department of Natural Resources, with funding from NOAA Fisheries, is building a database and Geographic Information System based on 30 years of fishery-independent survey data. Fishery surveys with trawls, various fish traps, plankton nets, experimental longlines, remotely-operated underwater video and submersible have been conducted since 1973 off the southeastern U.S. coast. Geographic coverage includes shelf and slope waters between Cape Canaveral and West Palm Beach, Florida, from depths of 9-600 m. The GIS will be used to access and present data on individual species, including distribution, catch (abundance, biomass) per unit effort and/or per unit area, length frequency, spawning location and distribution of larval stages. Community structure data included in the GIS will include total fish biomass, total fish abundance and indices of diversity, each calculated per unit area. These data can be used to determine areas of particularly high fish standing stock and diversity, and areas important as spawning and nursery grounds. Hydrography and bottom type data are also available and will be mapped for correlation with patterns in fish distribution and abundance. The final product will be an internet-based GIS that will allow managers to access data and maps on distribution of fishery species and habitats. The GIS can be used to develop ecosystem-based management plans that incorporate habitats that are important for different life history stages or which support a high biodiversity. Trends in catch data can also be analyzed to determine trends in relative abundance of species. Historical data and long-term trend analysis of biomass, abundance, diversity and distribution of fishes in the region are currently lacking, and determining areas that have historically supported higher diversity and biomass of fishes might be useful in the development and management of marine protected areas in the region.

Incorporating Public Process in Programmatic Review: Lessons Learned

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Conducting a programmatic review of the Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fishery management plans has engendered valuable lessons concerning both the necessity of public involvement in such a review and the manner in which such involvement is solicited. Following legal and public controversies and two programmatic drafts, several public relations lessons have been learned that can usefully be applied to similarly global and controversial environmental reviews.

First, it is important to sequence the decision points in order to involve the appropriate stakeholders at each stage in the review process, and focus the discussion. The first decision point is to determine the overall policy that will govern the plan. This involves balancing the diverse goals and objectives advocated by public interest groups and required by federal law to construct a cohesive and unified management approach. As this step is a global evaluation of the policy direction, it involves all stakeholders equally.

An effective tool to maximize public involvement and focus public comment in the development of a management approach is to use strawman proposals and successive iterations of working drafts. As with any negotiation, it is necessary to weave together diverse proposals, sometimes several times, before a management framework can be developed that is supported by a majority of stakeholders in addition to meeting legal mandates.

There are several practical methods for encouraging public participation and continual feedback:

- Public meetings and stakeholder workshops extend the traditional public hearing with informal question and answer sessions, or small stakeholder workshops that give all interested parties an opportunity to contribute their suggestions to the development of the policy framework in a less intimidating, more casual atmosphere;
- Integration with the Council meeting process; use the Council forum to encourage public input and work through iterations of the management approach; and
- Website and newsletters; create a project website to post strawman proposals and working drafts and announce updates. Project newsletters targeted at interested individuals and vested stakeholders can highlight implications of the program review and encourage continued engagement in the process.

Once the management approach is determined, the next decision point of the programmatic review process is to determine the order in which to evaluate elements of the specific fishery management regime in light of the newly adopted policy, since all evaluations cannot be undertaken simultaneously. These evaluations are more similar to traditional Council actions, and public involvement processes will likely already be in place. At this point, the stakeholder audience will also be more selective, as specific issues are dealt with individually. However, as these evaluations will be performed over a period of time, it will be important to provide periodic status reports to both the decisionmakers and the public. This can be accomplished through the use of an annually reviewed workplan, which would allow decisionmakers to adjust to unforeseen external circumstances while allowing the public to contribute to the prioritization of issues.

Steller Sea Lion Protection Measures Environmental Impact Statement

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The endangered Steller sea lion ranges throughout the management areas of federally managed groundfish fisheries in the Gulf of Alaska and Bering Sea/Aleutian Islands. Adult and juvenile Steller sea lions have declined by about 80% since the population size was estimated in the late 1950s. A Biological Opinion prepared in 2000 under the Endangered Species Act (ESA) on all aspects of these fisheries concluded

that fisheries for walleye pollock, Pacific cod, and Atka mackerel jeopardize the continued existence of Steller sea lions and adversely modify their critical habitat due to competition for prey and modification of their prey field.

Several alternative fisheries management measures to address sea lion concerns were developed using a unique stakeholder process. These management measures varied the degree and direction of impacts the fisheries have on marine resources, fishers, processors, and coastal communities. Because the changes to the federal fishery management program constituted significant impacts to the human environment, the appropriate level of environmental analysis to inform the decision was determined to be an environmental impact statement (EIS) prepared pursuant to the National Environmental Policy Act (NEPA). Both significantly positive and significantly negative impacts were disclosed in the EIS, and a Biological Opinion was included for the preferred alternative. Resulting fisheries regulations required detailed management and enforcement consideration. The Steller Sea Lion Protection Measures EIS was completed on schedule allowing orderly promulgation of the groundfish fisheries, and the EIS itself was not subjected to legal appeal. Shortly after completion of these fishery management revisions, the longstanding lawsuit (Greenpeace v NMFS, U.S. District Court for the Western District of Washington, C98-0492Z, under Judge Thomas S. Zilly) was settled.

The poster consists of photographs depicting the protected species and marine fisheries issues along with long term commercial harvest data, some of the scientists that collaborated to develop alternatives, and the diagrammatic map of fisheries management measures chosen in the preferred alternative. It reflects successful collaboration and conflict resolution between NOAA Fisheries, the agency charged with managing marine fisheries and protected species, and the North Pacific Fishery Management Council, one of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 to manage fisheries in the 200-mile Exclusive Economic Zone.

NOAA Fisheries Alaska Region and the North Pacific Fishery Management Council were awarded the 2003 Excellence in NEPA award by the National Association of Environmental Professionals for this project. This award was a first for a fishery management project.

NOAA Fisheries National Environmental Policy Act (NEPA) Training Program

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NOAA Fisheries is responsible for the oversight of living marine resources. This responsibility includes several mandates: the management of sustainable fisheries, the recovery and protection of marine mammals and endangered and threatened species, and the conservation and restoration of marine habitat. The agency works closely with regional Fishery Management Councils, states, and numerous constituencies to implement regulations that fulfill these mandates. Regulations issued affect not just marine resources but also the people, businesses, and communities associated with these resources.

In recent years, the agency has been subject to a significant number of legal challenges to its regulatory actions. Congress called the round of litigation "a crisis" in the FY 2002 appropriations report language. The regulatory process is complex; extensive analyses and documentation are required to comply with the numerous laws and Executive Orders. In response to increasing litigation and recognition of shortcomings in compliance with process requirements, the agency conceived a Regulatory Streamlining Project (RSP). The goal of RSP is to improve the efficiency and effectiveness of operations and increase compliance with all procedural requirements. It is based on reconnecting the agency and regional fishery management councils with their Congressionally charged requirements, including that the decision-making body have before them a complete analysis predicting the direct, indirect, and cumulative impacts for a full range of alternatives prior to their final decision.

Fundamental to success of RSP is better and more focused training of staff and constituents in application of the laws and Executive Orders. The agency hired NEPA Coordinators, one in each region, and provided

support and funding for them to conduct NEPA training. In the past three years, NEPA training customized to marine fisheries actions has been developed and is being delivered to agency staff, council and cooperating agency staff, attorneys, and constituents around the nation.

The poster shows the overall decision making process from determination of the appropriate level of NEPA analysis, flowchart of steps in the NEPA process, and pictorial examples of marine fisheries actions triggering NEPA. Several different short courses have been developed recognizing the different needs of staff preparers and constituent reviewers.

Effects of Rationalization

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This paper examines the effects of rationalization on incidental catches of fish and other marine life that are not specifically included in the rationalization program. There has been a significant amount of work done documenting reductions in incidental catches of managed species within IFQ, ITQ, cooperatives and other rationalization programs, but little focus has been paid to marine species that are not directly managed. The fact that incidental catch reductions of these unmanaged species have not been documented is focal point of many non-governmental organizations that argue against further rationalization of U.S. fisheries. This paper rectifies this lack of documentation by using fishery observer data to examine incidental catches of non-managed species before and after implementation of rationalization programs.

West Coast fisheries that have been rationalized since the early 1990s include the sablefish and halibut fisheries in Alaska; the offshore Pacific whiting fishery off the coasts of Oregon, Washington, and California; the pollock fishery in the Bering Sea, and the North Pacific scallop fishery. Nonmanaged species in each fishery are defined as species for which there is no specific limit within the fishery, or any other regulation that requires interactions to be minimized. For example, in the halibut fishery in Alaska, there is no specific limit on groundfish species such as Pacific cod and many of the rockfish species. In the scallop fishery, there are specific limits on the amount of crab taken incidentally, but no limits on the amount of starfish, for example, that are caught. The *a priori* expectation is that the rationalized objective of maximizing net revenue will lead harvesters to reduce costs by reducing incidental catches even though these non-managed species are not a regulatory constraint.

EPA Review of Fishery Management Plan and Essential Fish Habitat Environmental Impact Statements

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Pursuant to Section 102(C) of NEPA and Section 309 of the Clean Air Act, EPA reviews and comments on proposed major federal agency actions significantly affecting the quality of the human environment. Section 309 of the Clean Air Act requires EPA to review the proposed actions of other federal agencies in accordance with NEPA and to make the results of those reviews public. By implementing its NEPA responsibilities and commenting effectively on fisheries management actions that impact our oceans and marine ecosystems, EPA can help in NMFS's effort to support sustainable fisheries and protect sensitive marine resources.

This poster provides a roadmap on EPA's focus during Section 309 review of Fishery Management Plan and Essential Fish Habitat Environmental Impact Statements.

NOAA Fisheries Taking Action to Reduce Seabird Incidental Take in Fisheries

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Increased concerns have arisen about the incidental capture of non-target species, including seabirds, in various fisheries throughout the world. In response to these concerns, the United Nations' Food and Agriculture Organization (FAO) adopted an International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA) in 1999. The IPOA is a voluntary measure that calls on member states to: (1) assess the degree of seabird incidental take in their longline fisheries, (2) develop individual national plans of action to reduce seabird incidental take in longline fisheries that have a seabird incidental take problem, and (3) develop a course of future research and action to reduce seabird incidental take.

The U.S. developed its National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (NPOA) in 2001. Implementation of the NPOA is a collaborative effort between NOAA Fisheries, the U.S. Fish and Wildlife Service (USFWS) and the Department of State (DOS), carried out in large part by an Interagency Seabird Working Group (ISWG) consisting of representatives from those three agencies. Also in 2001, NOAA Fisheries appointed its National Seabird Coordinator to head up its NPOA implementation initiatives. This work requires maintenance of a national perspective through coordinated regional activities.

NOAA Fisheries has taken numerous actions at the regional, national, and international level to implement our NPOA and reduce seabird incidental take in fisheries. These actions have occurred in collaboration with various partners — USFWS, DOS, research scientists and academia, longline fishermen, and advocates from non-governmental environmental groups. Examples of NOAA Fisheries action include:

Regional
- Mandatory requirements for seabird avoidance gear in Alaska and Hawaii longline fisheries;
- Cooperative research projects to develop effective mitigation strategies — with Sea Grant, academia, longline industry groups in Alaska and Hawaii;
- Observer seabird identification guides for improved data collection — Alaska guide, Atlantic guide (in preparation);
- All observer program protocols include collection of data on seabird takes/entanglements; and
- Outreach to fishermen and public — videos, workshops, Fish Expo, seabird ID placards in Alaska, Hawaii, California, Washington.

National
- Development and continued implementation of NPOA; and
- National Bycatch Strategy that addresses seabird issues.

International
- Diplomatic demarches (cables) to 23 longlining nations to promote implementation of the FAO's IPOA;
- Address seabird incidental take issues in bilateral fishery meetings with other governments;
- Collaborate with Chile for a joint seabird incidental take proposal to APEC's Fisheries Working Group;
- ICCAT adopts a seabird resolution in 2002, as jointly proposed by Brazil, Japan, and the U.S.;
- Support the 2nd International Fishers Forum in 2002 to address seabird and sea turtle incidental take in longline fisheries;
- Participate at CCAMLR's working group on "Incidental Mortality Associated with Fishing"; and
- Exchange information with a network of international specialists around the world to focus on seabird incidental take reduction.

Protected Species Workshops for Longline Fisheries

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The Protected Species Workshops were created out of the growing need to address issues of protected species bycatch in longline fisheries. The workshops evolved from the concept of fishermen as participants in mitigation efforts and were based on guidelines developed by the Pacific Islands Fishery Science Center on releasing hooked sea turtles with minimal injury. These turtle handling guidelines along with seabird handling guidelines were incorporated into the Protected Species Workshop. In 2000, as a result of litigation, new regulations to protect sea turtles were promulgated, which included the line-clipper rule and a measure requiring mandatory attendance at a Protected Species Workshop by vessel captains. In 2001, the US Fish and Wildlife Service Biological Opinion on the short-tailed albatross also resulted in required annual attendance at a Protected Species Workshop, designed to teach best survival techniques for hooked and entangled short-tailed albatross.

The Protected Species Workshops are a cooperative effort between NOAA Fisheries and other agencies such as the Western Pacific Fishery Management Council, Hawaii Longline Association, US Fish and Wildlife Service and non-governmental organizations. The objectives of these workshops are to do the following:

- Educate fishermen in best handling practices for sea turtles and seabirds that are accidentally hooked or entangled on longline gear;
- Teach seabird and sea turtle identification on species that may interact with the fishing gear;
- Review current regulations;
- Describe current research related to sea turtles and seabirds; and
- Provide a forum for fishermen to ask questions and provide comments to NOAA Fisheries.

The Role of NOAA Fisheries Observer Programs in Monitoring Bycatch in U.S. Fisheries

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To effectively reduce fisheries bycatch, it is critical to have a credible estimate of the type, rate, and level of bycatch currently occurring, as well as information on the fishing practices and other factors that may contribute to bycatch. Although many methods have been used to estimate bycatch, the collection of fisheries data by observers deployed on fishing vessels represents the most reliable method available for estimating bycatch. Observers are also useful for monitoring the effectiveness of bycatch reduction measures, and for monitoring how well fishermen are adhering to mandatory bycatch reduction requirements.

The National Marine Fisheries Service deploys more than 500 observers per year in over 25 fisheries, on vessels ranging in size from small skiffs to large factory trawlers, and collect close to 40,000 sea days of information annually. One of the primary goals of U.S. observer programs is to estimate bycatch of protected species (marine mammals, sea turtles, and sea birds), prohibited species (halibut, salmon), and fishery discards.

The poster will highlight the legislative authorities that mandate the placement of observers in U.S. fisheries, the types of information observers typically collect, how these data are used to estimate bycatch, the fisheries that are currently monitored by observers, and the role that fishermen can play in ensuring the success of observer deployments. More information about NOAA Fisheries observer programs can be found at: http://www.st.nmfs.gov/st1/nop/.