

**DATA COLLECTION ISSUES
IN RELATION TO THE
REAUTHORIZATION OF THE
MAGNUSON-STEVENSON FISH-
ERY CONSERVATION AND
MANAGEMENT ACT**

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON FISHERIES, WILDLIFE,
OCEANS AND INSULAR AFFAIRS

OF THE

COMMITTEE ON NATURAL RESOURCES

U.S. HOUSE OF REPRESENTATIVES

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**OVERSIGHT HEARING ON “DATA COLLECTION
ISSUES IN RELATION TO THE REAUTHOR-
IZATION OF THE MAGNUSON-STEVENSON FISHERY
CONSERVATION AND MANAGEMENT
ACT”**

Tuesday, May 21, 2013

U.S. House of Representatives

Subcommittee on Fisheries, Wildlife, Oceans, and Insular Affairs

Committee on Natural Resources

Washington, D.C.

The Subcommittee met, pursuant to notice, at 10:33 a.m., in room 1334, Longworth House Office Building, Hon. John Fleming [Chairman of the Subcommittee] presiding.

Present: Representatives Fleming, Wittman, Southerland, Runyan, Hastings; Sablan, Pallone, Bordallo, Shea-Porter, and Lowenthal.

Also Present: Representative Keating.

Dr. FLEMING. The Committee will come to order. The Chairman notes the presence of a quorum, which, under Committee Rule 3(e), is two Members. The Committee on Natural Resources is meeting today to hear testimony on data collection issues related to the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. Under Committee Rule 4(f), opening statements are limited to the Chairman and Ranking Member of the Committee, so that we can hear from our witnesses more quickly. However, I ask unanimous consent to include any other Members' opening statements in the hearing record, if submitted to the Clerk by close of business today.

[No response.]

Dr. FLEMING. Hearing no objection, so ordered.

**STATEMENT OF THE HON. JOHN FLEMING, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF LOUISIANA**

Dr. FLEMING. Today's hearing is the second in a series we will be holding this Congress on the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. As you may remember, we started the reauthorization process in the last congress, and we will continue to hear testimony on the key aspects of this important law.

In hearings that this Subcommittee held last Congress and so far this year, there has been one continuing message: We need better data. I think we will all agree that good science is critical to good management decisions. For fishery scientists to make good recommendations, and then for fishery managers to make good management decisions, they must have good data.

This has become even more apparent with the 2009 rewrite of the National Standard Number One Guidelines. This revision resulted in increased levels of buffers when both scientific and management uncertainties were present. This change has highlighted the fact that data collection programs in certain regions of the

country have been neglected. While data is limited in certain regions, we hope today's witnesses will give us some ideas for how this can be turned around.

One of today's witnesses will describe a cooperative research program in which a portion of the fishery quota has been reserved for research purposes, and a cooperative program between a university, the States, commercial fishermen, and Federal scientists has yielded significant fishery information without cost to the Federal Government. This is the type of program that could be replicated in other areas of the country without increasing Federal spending: something we all need to think more about.

And while cooperative research is nothing new, it certainly has benefits. On the East Coast a number of years ago, NOAA was on the verge of closing the monkfish fishery until a cooperative research initiative that involved agency, scientist, and commercial fishermen showed that the fishery was in much better shape than the agency surveys had indicated. Without those cooperative research surveys, that fishery would likely be closed today.

In addition to using new ideas and new technology, we need to do a better job of prioritizing what funding we have now.

The 2006, 2007 amendments to the Magnuson-Stevens Act required each council, along with their scientific and statistical committees, to develop a priority list of the information they needed for management purposes. This 5-year research priority list was required to be submitted to the Secretary and the regional science centers. It is unclear whether the science centers have made changes to their funding priorities based on the council's suggestions. But it is clear that, in some regions, the information necessary for good management has been lacking.

In addition to better information, we continue to hear from our witnesses that there needs to be better transparency in both the collection of data and how the data is used. Involving fishermen in the collection of data through things like cooperative research will make the management process better for everyone.

And even in cases where fishery information is available, we have heard that agency scientists are reluctant to incorporate data from outside sources in their stock assessments. This needs to change.

Finally, we need to make sure that data is delivered to fishery managers in a timely manner. Basing management decisions on 3 or 4-year-old information is not likely to produce good management results. And when fishermen do not trust the information that management decisions are being made on, or the information does not match what they are seeing on the water, the whole system is undermined. This is especially apparent in the Gulf of Mexico red snapper fishery.

[The prepared statement of Dr. Fleming follows:]

**Statement of The Honorable John Fleming, Chairman,
Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs**

Good morning. Today's hearing is the second in a series we will be holding this Congress on the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. As you may remember, we started this reauthorization process in the last Congress and we will continue to hear testimony on the key aspects of this important law.

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I think we will all agree that good science is critical to good management decisions. For fishery scientists to make sound recommendations and then for fishery managers to make good management decisions, they must have good data.

This has become even more apparent with the 2009 rewrite of the National Standard #1 Guidelines. This revision resulted in increased levels of buffers when both scientific and management uncertainties were present. This change has highlighted the fact that data collection programs in certain regions of the country have been neglected.

While data is limited in certain regions, we hope today's witnesses will give us some ideas for how this can be turned around.

One of today's witnesses will describe a cooperative research program in which a portion of the fishery quota has been reserved for research purposes and a cooperative program between a university, the states, commercial fishermen, and Federal scientists has yielded significant fishery information without cost to the Federal Government. This is the type of program that could be replicated in other areas of the country without increasing Federal spending—something we all need to think more about.

And while cooperative research is nothing new, it certainly has benefits. On the east coast a number of years ago, NOAA was on the verge of closing the monkfish fishery until a cooperative research initiative—that involved agency scientists and commercial fishermen—showed that the fishery was in much better shape than the agency's surveys had indicated. Without those cooperative research surveys, that fishery would likely be closed today.

In addition to using new ideas and new technology, we need to do a better job of prioritizing what funding we do have. The 2006/2007 amendments to the Magnuson-Stevens Act required each Council, along with their Scientific and Statistical Committees, to develop a priority list of the information they needed for management purposes. This five-year research priority list was required to be submitted to the Secretary and the regional science centers. It is unclear whether the science centers have made changes to their funding priorities based on the Councils' suggestions, but it is clear that in some regions, the information necessary for good management has been lacking.

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I look forward to hearing the testimony from today's witnesses.

Dr. FLEMING. I look forward to hearing from our witnesses, and now recognize the Ranking Member for 5 minutes for any statement that he may have.

**STATEMENT OF THE HON. GREGORIO KILILI CAMACHO
SABLAN, A DELEGATE IN CONGRESS FROM THE NORTHERN
MARIANA ISLANDS**

Mr. SABLAN. Thank you very much, Mr. Chairman, and good morning, everyone. Today we will hear testimony on the importance of data collection to fisheries management under the Magnuson-Stevens Act. One common theme we will likely hear throughout the discussion is that, in many cases, data is insufficient to manage fish stocks sustainably without large, precautionary buffers. This uncertainty frustrates fishermen, who

would be allowed a greater catch if science were to improve. It also frustrates managers who, in the absence of precise and accurate information about the health of target stocks, species, habitat, and environmental conditions, face difficulty in setting catch limits with buy-in from the fishing community.

On one hand, we have to find ways to work smarter, using technology and innovation to improve data collection while reducing the burden on taxpayers and the regulated community. Some of our witnesses today will discuss cooperative research programs and alternative data collection strategies that can help accomplish these goals.

On the other hand, though we also have to recognize that, like in so many industries in this country, no one could make a living for very long fishing without significant investment from the Federal Government. And while sustaining some industries depend on roads, ports, or procurement contracts, sustaining fisheries depends on data. Unfortunately, Federal support for fishery science has remained stagnant in recent years, as data needs have increased.

Given these resource constraints, we have done a good job, overall, of managing our fisheries under the Magnuson-Stevens Act, particularly since the bipartisan 2006 reauthorization added science-based annual catch limits and accountability measures. The status of stocks report recently released by NOAA shows that an additional six fish stocks were rebuilt in 2012, and that the percentage of stocks with known status that were over-fished fell from 14 percent to 10 percent.

The most recent economic figures show that the value of U.S. fisheries is at an all-time high. However, the fact that we have insufficient information to determine whether or not more than half of federally managed fish stocks are over-fished reminds us that we still have a lot of work to do.

The situation is further complicated by changes in the diet, habitat, and range of target species due to climate change. A paper published last week in the journal "Nature" concluded that climate change has been forcing fish northward to cooler waters for the better part of a century. This disturbing trend has major implications for the people of the Northern Mariana Islands and other tropical communities that depend on fish, not just for livelihoods, but for their lives. When the waters around our shores become too hot for tropical species, it is unlikely that there will be anything else to replace them when they leave. We will need even more data and resources to understand the impacts climate change is having on our oceans, and to integrate that information into stock assessments and management strategies.

As many a scientist has said, counting fish is difficult because you can't see them and they move around. While this is clearly true and challenging, I am confident that with the proper investments we can continue strengthening the science that informs fishery management. I look forward to hearing from our witnesses on how we might use innovative strategies and partnerships to improve data quality and quantity to preserve fish stocks, fishing jobs, and coastal communities now and in the future.

And I yield back my time, Mr. Chairman.

[The prepared statement of Mr. Sablan follows:]

Statement of The Honorable Gregorio Kilili Camacho Sablan, Ranking Member, Subcommittee on Fisheries, Wildlife, Oceans, and Insular Affairs

Thank you, Mr. Chairman.

Today we will hear testimony on the importance of data collection to fisheries management under the Magnuson-Stevens Act. One common theme we will likely hear throughout the discussion is that in many cases, data is insufficient to manage fish stocks sustainably without large precautionary buffers. This uncertainty frustrates fishermen, who would be allowed a greater catch if science were to improve. It also frustrates managers who, in the absence of precise and accurate information about the health of target stocks, forage species, habitat, and environmental conditions face difficulty in setting catch limits with buy-in from the fishing community.

On one hand, we have to find ways to work smarter, using technology and innovation to improve data collection while reducing the burden on taxpayers and the regulated community. Some of our witnesses today will discuss cooperative research programs and alternative data collection strategies that can help accomplish these goals. On the other hand, though, we also have to recognize that like in so many industries in this country, no one could make a living for very long fishing without significant investment from the Federal government. And while sustaining some industries depends on roads, ports, or procurement contracts, sustaining fisheries depends on data. Unfortunately, Federal support for fisheries science has remained stagnant in recent years as data needs have increased.

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Dr. FLEMING. The Ranking Member yields back.

And I now recognize the full Committee Chairman, Mr. Hastings, for opening statement.

STATEMENT OF THE HON. DOC HASTINGS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. HASTINGS. Thank you, Mr. Chairman, and thank you again for the courtesy of allowing me to make my statement.

I want to thank you for taking the lead on this important issue relating to the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. This Act, like many other statutes dealing with natural resource use, requires sound science so that our country and future generations can enjoy the economic benefits of its renewable resources.

We have heard testimony at previous hearings that some regions of the country have serious data needs. While the Pacific Northwest in my area has enjoyed robust data collection programs, I hope we will look at ways to get better data from those regions that are in need without taking away from those regions whose programs have proven effective.

Currently, more than 60 percent of the seafood landed in the U.S. is harvested off Alaska and the West Coast. Maintaining these important and valuable fisheries by continuing to collect necessary data is important. While the NOAA fishery data collection programs in my region of the country are critical, in many of the fisheries off Alaska and West Coast, significant data is collected or paid for by industry.

While some fisheries are able to shoulder these costs, an increasing burden is being placed on our fishermen, making us less competitive in the global marketplace. Data is critical for these fisheries to operate efficiently. But if additional data are necessary, Federal agencies need to work with fishermen to find new technologies or other innovative means of collecting and paying for these added burdens.

Additional surveys and new technologies obviously cost money. It is clear that Federal budgets are stretched thin. So we, therefore, need to look at ways to do things better than relying on the same data collection tools that we used 50 years ago. We will hear from one witness today whose fishery is willing to undertake a new type of data collection, electronic monitoring, which uses cameras to supplement on-board observer coverage in the fishery. As I understand it, this proposal is being held up by lawyers because of the debate about whether the program is intended for data collection or enforcement purposes. Unfortunately, this dispute is delaying the use of a promising new tool for fishery managers.

And speaking of lawyers, as a result of litigation, the lack of stock assessment on the Atlantic sturgeon led to a questionable listing under the Endangered Species Act by the National Marine Fisheries Service. A benchmark stock assessment is now underway that will likely set the record straight. But until that happens, time and money are being spent on determining whether other activities might be endangering sturgeon, and potentially forcing restricting measures when the initial listing may not have even been necessary in the first place.

Those of us from the Pacific Northwest know all too well how Endangered Species Act listings can result in an expansive amount of regulation on literally every activity tied to watersheds, rivers, or estuaries where a listed species has been identified. The Atlantic Sturgeon listing resulted from a lawsuit by a group seeking to exploit a weakness in the Federal science, and is based on a lack of recent data. This is the latest example of certain groups exploiting scientific weaknesses to support questionable ESA listings, filing countless lawsuits, and forcing Federal agencies into closed-door settlements that results in arbitrary deadlines and costly regulatory measures that are not based on sound science or data.

So, Mr. Chairman, I hope this hearing will spark some new thinking about what we can do to get much-needed information so that we can maximize the use of our fishery resources. So I look

forward to the testimony of our witnesses and their thoughts on whether the Magnuson-Stevens Act requires amending, or whether we can achieve better data and implement new technology without major changes to the Act.

And with that, Mr. Chairman, thank you for the courtesy, and I yield back the time.

[The prepared statement of Mr. Hastings follows:]

**Statement of The Honorable Doc Hastings, Chairman,
Committee on Natural Resources**

Mr. Chairman, I want to thank you for taking the lead on this important issue related to the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. This Act, like many other statutes dealing with natural resource use, requires sound science so that our country, and future generations, can enjoy the economic benefits of its renewable natural resources.

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While the NOAA fishery data collection programs in my region of the country are critical, in many of the fisheries off Alaska and the West Coast, significant data is collected or paid for by industry. While some fisheries are able to shoulder these costs, an increasing burden is being placed on our fishermen making us less competitive in the global marketplace. Data is critical for these fisheries to operate efficiently, but if additional data are necessary, Federal agencies need to work with fishermen to find new technologies or other innovative means of collecting and paying for these added burdens.

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And speaking of lawyers—as a result of litigation, the lack of a stock assessment on Atlantic sturgeon led to a questionable listing under the Endangered Species Act by the National Marine Fisheries Service. A benchmark stock assessment is now underway that will likely set the record straight, but until that happens, time and money are being spent on determining whether other activities might be endangering sturgeon, and potentially forcing restrictive measures when the initial listing may not even have been necessary. Those of us from the Pacific Northwest know all too well how Endangered Species Act listings can result in an expansive amount of regulation on literally every activity tied to watersheds, rivers, or estuaries where a listed species has been identified. The Atlantic sturgeon listing resulted from a lawsuit by a group seeking to exploit a weakness in the Federal science and is based on a lack of recent data. This is the latest example of certain groups exploiting scientific weaknesses to support questionable ESA listings, filing countless lawsuits, and forcing Federal agencies into closed-door settlements resulting in arbitrary deadlines and costly regulatory measures that are not based on sound science or data.

Mr. Chairman, I look forward to today's testimony and I hope it will spark some new thinking about how we can get much-needed information so that we can maximize the use of our fishery resources. I also look forward to hearing from our witnesses today and am interested in their thoughts on whether the Magnuson-Stevens Act requires amending or whether we can achieve better data and implement new technology without changes to the Act.

Dr. FLEMING. I thank the gentleman, the Chairman, for his statement. And now we would like to hear from our witnesses. I will introduce them.

First, Dr. Richard Merrick, Chief Science Advisor, National Marine Fisheries Service, National Oceanic and Atmospheric Administration; Mr. Randy Fisher, Executive Director, Pacific States Marine Fisheries Commission; Mr. Robert Beal, Executive Director, Atlantic States Marine Fisheries Commission; and Mr. David Donaldson, interim Executive Director, Gulf States Marine Fisheries Commission.

First of all, witnesses, like all witnesses, your written testimony will appear in full in the hearing record. So I ask that you keep your oral statement to 5 minutes, as outlined in our invitation letter to you—under Committee Rule 4(a).

Our microphones are not automatic. And also, be sure the tip is close to you, so we can hear you.

And I will explain the timing lights, they are very simple. You start off on the green. After 4 minutes it turns yellow. You have 1 minute left. And at the end of that 1 minute, which will be a total of your 5 minutes, it turns red and we ask that you go ahead and conclude any remarks, if you haven't already. Therefore, the Chair recognizes Dr. Merrick for 5 minutes, sir.

STATEMENT OF DR. RICHARD L. MERRICK, CHIEF SCIENCE ADVISOR, NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Dr. MERRICK. Good morning, Chairman Hastings, Chairman Fleming, and Ranking Member Sablan. Thank you for having me here to talk about data collection. My name is Richard Merrick.

And, as you recognized, NOAA Fisheries is dedicated to conservation, protection, and management of our living marine resources to ensure functioning, green ecosystems, and continuing recreational and economic opportunities for the American public. NOAA is an acknowledged world leader in the use of fishery science to rebuild over-fished stocks and to end over-fishing.

Our science-based approach to management, as mandated within the Magnuson-Stevens Act, the MSA, has proven to provide better resource management than would occur without this advice. This, in turn, has led to improved productivity and sustainability of fisheries and fishery-dependent businesses.

I grew up in a family that ran a charter boat business in Atlantic City, New Jersey. So it was logical that my first job with NOAA was as a fishery observer in the Shelikof Strait of Alaska's pollock fishery. I spent the remaining 30 years or so with the Agency using fishery-related data to support NOAA's stewardship mission. And today I will provide some observations on the importance of the core data that we collect to support this mission, and I will focus on stock abundance and catch.

Our ship-based surveys of fish abundance are important to science-based management. We conduct these standardized surveys over the range of fish stocks, often on an annual basis, to measure the change in the fish numbers of biomass over time. These data are all key inputs to many of our stock assessments.

These surveys are conducted in every region, using NOAA-owned fishery research vessels, as well as charter commercial fishing boats. We also partner with industry, State, and academic researchers to conduct cooperative surveys. Collaborative work like that in the Bering Sea and the Gulf of Alaska groundfish fisheries provides valuable data and enhances our communication between scientists, fishermen, and our partners.

Other partnerships like NEAMAP in the Mid-Atlantic and CMAP in the Gulf of Mexico, which I think you will hear about, are also important for collecting data on stocks near shore.

Fishery catch data are as important as ship survey data. In some cases, it is the only information we have to manage stocks. We collect data on landed catch and at-sea discards in a variety of ways. For commercial catch data, we obtain those from dealers, from the vessel trip reports that fishermen provide, from fishery observers, and from the use of electronic monitoring techniques like electronic reporting of catches and video cameras aboard vessels. Our fishery commissions run programs like GulfFIN, PacFIN, and the ACCSP, which are essential to obtain data from fishing activities in State waters.

Obtaining adequate recreational catch data is equally important, particularly because recreational fisheries are a significant component of the total catch of a stock in the Gulf of Mexico in the South Atlantic regions. Our marine recreational information program, or MRIP, which became operational last year, is applying new and improved methods to the challenge of estimating total catch by the millions of recreational salt water anglers.

Finally, I would like to quickly highlight three challenges to our data collection and stock assessment activities.

One key challenge is the continuing improvement of the quality of our data analyses. And this is vital to maintaining and enhancing the accuracy and precision of the assessments, and the credibility of the management activities. One solution here is to develop new survey methods, and we look to our partners and our stakeholders for advice on how we can best improve our data collection. As you may hear from Dr. Stokesbury, we have worked with the University of Massachusetts School of Marine Science and Technology, or SMST, for many years to develop techniques that would improve Atlantic sea scallop assessments, and we are now collaborating with SMST to use video to count fish in a trawl net. So, implementing these new approaches will mean more science for the dollar.

We have also embarked on a series of science center program reviews to identify strengths, weaknesses, and opportunities for improvement. And this year we will review all of our science center's data collection programs, beginning this June. A second challenge arises from our growing understanding that historical data sets are becoming less reliable in predicting future stock performance, given the changing ocean environment. This makes our ecosystem process studies all the more important.

Finally, funding is the third challenge. And since passage of the reauthorized MSA, the Administration has consistently requested to increase funding for these activities, and we greatly appreciate the support that Congress has given us. However, the Fiscal Year

2013 budget presents some unique challenges to our ability to implement the science that underpins fisheries management.

So, I would like to thank you again for your support to date, and for the opportunity to discuss fisheries data. And I look forward to answering your questions in a few minutes.

[The prepared statement of Dr. Merrick follows:]

Statement of Dr. Richard L. Merrick, Chief Science Advisor and Director of Scientific Programs, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Introduction

Good morning, Mr. Chairman and Members of the Committee. Thank you for the opportunity to testify before you today on fisheries data collection. My name is Richard L. Merrick, and I am the Chief Science Advisor and Director of Scientific Programs for the National Marine Fisheries Service (NMFS) within the National Oceanic and Atmospheric Administration (NOAA). NMFS is dedicated to the stewardship of living marine resources through science-based conservation and management, and the promotion of healthy ecosystems. As a steward, NMFS conserves, protects, and manages living marine resources to ensure functioning marine ecosystems and recreational and economic opportunities for the American public.

NMFS is an acknowledged international leader in fishery science, rebuilding overfished stocks, and preventing overfishing. Today, we know more about our fish stocks than ever before, and it is vital that our science not regress, as this would inevitably lead to declines in our stocks and a loss in the economic and social values they provide.

Our progress in making fisheries management more effective is based on the principle that management is based on sound science. National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) mandates that all fisheries conservation and management measures must be based upon “the best scientific information available” (16 U.S.C. 1851(a)(2)). While we face challenges to securing accurate, precise, and timely data for stock assessments, on balance, our science-based management has consistently proven to provide better resource management than without this advice. This has, in turn, led to improved productivity and sustainability of fisheries and fishery-dependent businesses. In some fisheries, particularly the Northeast, the science has indicated the need to rebuild stocks but uncertainty in the science has confounded finding exactly the level of fishery restrictions needed to accomplish that rebuilding. In other fisheries, particularly in the Southeast, the large numbers of stocks exceed our current capacity to deploy surveys and conduct assessments of the status of these stocks. The quality and extent of our stock assessment enterprise has room for growth.

Sustainability of our Nation’s fisheries is based on continual monitoring of fish catch and fish stock abundance. Because this data-intensive endeavor is costly, NMFS and our partners have always focused on getting the most of the highest-priority and highest-quality data by fully using the funding Congress has provided for this vital work. This funding and the work it supports enables us to sustain and enhance our fisheries. NMFS continues to make substantial progress toward improving the quality of the science available to effectively manage commercial and recreational fisheries, benefiting coastal communities and the United States (U.S.) economy both today and for generations to come. We greatly appreciate the increased funding that Congress has provided to make U.S. fishery management, and its preeminence worldwide, possible.

Today, I will discuss how our fisheries science is conducted and how this science underpins and provides for good management. In particular, I will focus on methods we use to collect the data, what types of data are collected, how these data are used in fishery management, and the importance of our partners in our collection of data. I will also describe some of the recent advances we have made in our science.

How fishery surveys are conducted—including through the use of Federal vessels, charter vessels, or through other cooperative arrangements

Long-term monitoring of fish abundance provides an indicator of the abundance of stocks over time, and as such are invaluable inputs to stock assessments. Abundance data tell us the number or weight of a particular stock of fish in the ocean. Information on fish abundance is best obtained from standardized, fishery-independent surveys covering the extensive geographic range of the fish stocks. The average catch rate of fish typically is measured using standardized methods at hundreds of sampling locations over the range of a suite of fish stocks. A diversity of

conventional survey methods is employed, including bottom, mid-water, and surface trawls; longlines; gillnets; and traps, as appropriate for the particular target, habitat, and region. In addition, our surveys incorporate state-of-art technology, including various sonars and optical systems to survey reef fish in the Southeast and Atlantic sea scallops in the Northeast. These surveys are repeated, typically annually, to measure the change in catch rate over time, which is the cornerstone information of the fishery assessment models. In some cases, fishery-dependent data from fishermen's logbooks can be statistically processed to provide additional indicators of trends in fish abundance.

NOAA surveys in support of stock assessments are conducted in every region; 62 fish surveys were conducted in fiscal year 2012. These surveys are conducted on NOAA fishery survey vessels and on NOAA-owned small boats, as well as on chartered commercial fishing vessels, state-owned boats, and UNOLS (university-owned) ships.

NOAA survey vessels are a key source of fisheries-independent data. Seven ships in the NOAA fleet conduct many of the cruises to survey fish abundance. The fleet includes four new Dyson-class vessels with state-of-the art technological capabilities, with a fifth vessel in this class becoming available in 2014. The timing of these cruises, survey designs, and sampling methodologies are adapted to the specific region and stocks.

We augment NOAA vessel surveys with cooperative surveys involving industry, academic, and state government partners. These surveys commonly use chartered commercial vessels and employ local fishermen, who provide critical local knowledge of the region's stocks and fisheries. The surveys conducted using chartered vessels provide important data streams from regions and time periods when NOAA ships are not available. For example, since the 1970s, NMFS has conducted its primary groundfish surveys in the Bering Sea, Gulf of Alaska, and the Pacific coast by chartering local fishing vessels of suitable characteristics to work with NMFS scientists on board, using standardized sampling gear and strict statistical protocols to collect the data to support some of our most valuable fisheries. In the Northeast, NMFS charters a commercial vessel from the region for the annual surf clam and quahog survey. In some surveys, the chartered fishing vessels may be partially funded through research set-asides or other forms of cooperative research. These collaborative surveys provide valuable data and enhance communication between assessment scientists and fishermen. Other surveys are conducted on commercial fishing vessels with universities (e.g., the NEAMAP or Northeast Area Marine Assessment Program with the Virginia Institute of Marine Science), and state agencies (e.g., the Maine-New Hampshire Surveys Inshore Groundfish Trawl Survey with the Maine Department of Marine Resources and New Hampshire Fish and Game Department).

NOAA also charters state vessels for some surveys. State vessels are generally smaller than the NOAA vessels, and can operate in shallower near-shore and estuarine areas. This is particularly important for providing data on stocks that occur in these habitats. For example, the Southeast Area Monitoring and Assessment Program, commonly known as SEAMAP, is a collaboration dating back to 1977 involving NMFS, the Gulf States Marine Fisheries Commission, and the states bordering the Gulf of Mexico. Through funds transferred to the Commission and individual states via grants and cooperative agreements to conduct the surveys, SEAMAP provides much of the fisheries-independent data used in Gulf of Mexico stock assessments.

How landings and other harvest-related data are gathered and used

The catch monitoring programs strive to measure total catch, or the amount of fish removed through fishing. Rarely are fishery catch monitoring programs focused on single species or fisheries; instead, they are generally designed to monitor multiple species and fisheries over large geographic areas. One component—landed catch information—is obtained by monitoring commercial landings, largely in partnership with the states and the marine fisheries commissions. In some Alaskan fisheries, where the catch is processed at sea, fishery observers provide catch data. Observers also conduct at-sea monitoring of bycatch and collect information on discards in numerous fisheries in all regions. For recreational fisheries, NMFS' Marine Recreational Information Program is applying new and improved methods to the difficult challenge of estimating total catch by the millions of recreational saltwater anglers nationwide.

NMFS has a strong partnership with the states and the interstate marine fisheries commissions to conduct efficient and cost-effective monitoring of commercial landings and recreational catches. The federally funded Fisheries Information Networks have provided a means through which NMFS has been able to work collaboratively with its partners to design and implement well-integrated data collection

programs that meet the management needs of both state-managed and federally managed fisheries. Cooperative regional programs—such as the Atlantic Coastal Cooperative Statistics Program, the Gulf Fisheries Information Network, the Pacific Fisheries Information Network, the Pacific Recreational Fisheries Information Network, the Western Pacific Information Network, and the Alaska Fisheries Information Network—have worked effectively to eliminate unnecessary overlaps, standardize data elements and collection methods, and improve the timeliness of data processing, statistical analysis, and dissemination of catch statistics to all partners. Much of the commercial landings and recreational catch data is actually collected, processed, and managed by state agency personnel in accordance with procedures developed in collaboration with NMFS. Continued funding of the Fisheries Information Networks will be crucial for maintaining our current capabilities for monitoring commercial and recreational catches.

NMFS' National Fisheries Information System Program has provided a mechanism for cross-regional collaboration and sharing of ideas on how best to improve the timeliness, quality, and accessibility of commercial and recreational fishery catch information. The Fisheries Information System Program has been working to continue to develop electronic dealer reporting programs and electronic logbook reporting programs to provide more timely and accurate updates on commercial landings. The Fisheries Information System Program and the Fisheries Information Networks have also been working together to develop and implement information management architectures that will enable comprehensive access to complete and up-to-date state and Federal catch statistics within each region, as well as at the national level. Cooperative efforts are now also focused on improving quality management of catch data collection programs through enhanced reviews and evaluations of the current procedures for quality assurance and quality control. Improving the timeliness, accessibility, and quality of catch information is extremely important to facilitate the work of fishery managers in monitoring the success of implemented fishery management regulations.

Fisheries observers are trained biologists placed on board commercial fishing and processing vessels, as well as in some shoreside processing plants. They are the most reliable and most unbiased source of data on the actual at-sea performance of commercial fisheries. They collect data on bycatch, enabling accurate estimations of total mortality, a key component of stock assessment modeling. In some fisheries, they provide data on catches. They also provide high-quality data on interactions with protected species. This information is important to ensure that protected species stocks remain healthy and their interactions with fisheries are minimized, so that harvest opportunities are affected as little as possible. In fiscal year 2012, NMFS logged more than 83,000 observer days in 47 fisheries and employed 974 contracted observers. The observer programs were supported by a combination of government funds and industry funds.

Recreational fisheries are a significant, and sometimes the dominant, component of the total catch, particularly in the Gulf of Mexico and South Atlantic regions. NMFS has made a substantial effort to monitor those fisheries and incorporate data from recreational fisheries into fish stock assessments. These data are collected as part of NMFS' Marine Recreational Information Program.

Types of biological data collected and how the data are used for management purposes

Data on fish biology are collected to learn about fish longevity, growth, reproduction, movement, and other factors. The biological information we collect includes age data for many of our most important stocks. With the addition of fish age data, we are able to apply more complex and sophisticated stock-assessment models that provide better information on changes in fish abundance over time, more direct information on fish mortality rates caused by fishing, and more precise forecasts of future changes in fish abundance and potential annual catch limits. This provides important information about fluctuations in productivity and recruitment of new fish into the stock.

The sources of fish biology information are diverse, with important information coming from NMFS monitoring programs, academic studies, cooperative research, and other programs. Some important sources are fisheries-dependent, which provide key demographic information about the fish that are removed from the populations by fishing. For example, fisheries observers and dockside monitors take observations (e.g., length, weight, sex, and maturity) and collect otoliths (ear bones) from fish. The otoliths and their growth rings (similar to the annual growth rings in trees) are analyzed in on-shore laboratories. This suite of information provides important data for stock assessment models, and is vital for tracking changes in stock dynamics. Biological data are also collected on NMFS fishery-independent surveys where

it can be matched to environmental data collected on those surveys. Other sources of data on fish biology include cooperative research and academic studies. Waiting to get these age data is one of the factors that adds time between conducting a survey and updating the assessment using the whole, longer time series of catch, abundance, and biological data.

How stock assessments are conducted

All of the data discussed here provide the inputs for stock assessments. Passage of the Magnuson-Stevens Fishery Reauthorization Act in 2006 resulted in the need for more timely stock assessments to ensure overfishing has ended, to set Annual Catch Limits that prevent overfishing, and to track progress toward rebuilding overfished stocks.

NMFS manages 500-plus stocks; however, we had the data and capacity to assess an average of only 108 stocks each year from 2008 to 2012. Stocks without quantitative assessments have Annual Catch Limits set through alternative methods (e.g., averages of recent catches). Of these 500-plus stocks, 230 have been identified for inclusion in the Fish Stock Sustainability Index. These Fish Stock Sustainability Index stocks constitute over 90 percent of U.S. commercial landings, and many are important to recreational fisheries. For the Fish Stock Sustainability Index stocks, NMFS has been able to assess about 80 per year, including annual or biannual updating of important assessments, which maintains their status as adequate assessments, as well as some first-time assessments. These efforts have increased the number of FSSI stocks with adequate assessments from 119 in 2005 to 132 in 2012. For the purpose of tracking performance, an assessment is considered to be adequate for five years after its most recent update. The overall FSSI score—which tracks our knowledge about the stocks and about our progress in ending overfishing and rebuilding stocks—has increased by 63 percent since 2000. That substantial increase shows that investment in both science and management improves the sustainability of fisheries.

Assessment Process—Typically a major “benchmark” stock assessment involves two sets of workshops culminating in a peer-reviewed assessment. These workshops are open to the public, and constituents are encouraged to participate. The first workshop typically focuses on data—specifically the catch, abundance, and biology data used to calibrate the assessment models. Agency and university researchers, fisheries management council representatives, and partners get together to summarize and evaluate data sources, collection methods, reliability, and applicability of data for population modeling. Through a collaborative process, the workshop participants develop recommendations on which data inputs to include in assessments. Participation by fishermen is extraordinarily important, because their on-the-water observations of fish behavior help scientists correctly interpret factors such as unexpected changes in standardized index surveys.

The second workshop is held to calibrate the mathematical computer model, which generates a simulation of the fish population over time. NOAA has several standardized models that it maintains in a Toolbox. These models use sophisticated statistical approaches for dealing with data gaps and uncertainties, to blend the available data, and to forecast results with appropriate confidence intervals. Conceptually, this is similar to NOAA’s National Weather Service dynamic models, which use multiple observations to calibrate complex atmospheric models that predict the weather. Even though fish stock assessments operate on much longer time scales than weather models—months and years rather than hours and days—they similarly combine and incorporate many different complex observations into a holistic picture of the situation. NOAA scientists run the model with inputted abundance, biological, and catch data, which gives us the information to develop a stock assessment report that is the basis for a catch limit.

Independent external scientists review the stock assessment report and evaluate the quality of the assessment. They may conclude that the science is sound, recommend changes to improve the stock assessment, or, in some cases, reject some or all of the attempted analyses in the assessment. The peer-review process provides fishery managers and constituents with confidence in the integrity of assessments and assurance that they represent the best available science. The Magnuson-Stevens Act clarifies that such peer reviews are a valuable part of the management process. The Regional Fishery Management Councils’ Scientific and Statistical Committees use the peer-reviewed stock assessment results as the basis for providing fishing level recommendations to their respective Councils. NMFS is working with the Councils and their Scientific and Statistical Committees as each Council works to implement regionally relevant protocols for peer reviews and to expand the role of Scientific and Statistical Committees in providing fishing level recommendations.

Stock Assessment Quality—In addition to the peer review of assessments, NMFS is working to improve the quality of the data and analyses used in stock assessments. This is vital for maintaining and enhancing the accuracy and precision of our stock assessments and the credibility of the management actions that depend on them.

The agency complies with the requirements of the Information Quality Act, including OMB's guidance on transparency and balanced review of the influential science that is conducted. We have embarked on a lengthy process for a comprehensive update of National Standard 2 of the Magnuson-Stevens Act, which provides guidance on the scientific integrity of information used for the conservation and management of living marine resources. We anticipate publishing the final rule in the *Federal Register* soon.

NMFS has also embarked on a systematic process of science program reviews to identify strengths, weaknesses, and opportunities for improvement. These reviews will be repeated on a five-year cycle. The process began in fiscal year 2012, with every NMFS Science Center and the Office of Science and Technology conducting a comprehensive strategic review of their programs. Now in our second year in fiscal year 2013, the agency has initiated a comprehensive review of the programs that contribute data to stock assessments. The Science Center reviews of data collection processes will be complete this year.

How Federal fishery surveys and assessments are prioritized

Surveys are prioritized and scheduled to ensure data are available on a timely basis to support scheduled assessments. However, most surveys are repeated either annually or biennially to ensure a time-series is available to support the stock assessments. A single survey is difficult to use in assessment models. Note also that most surveys collect data on multiple species. For example, bottom trawl surveys in the Northeast simultaneously collect data on all 20 stocks in the Multispecies Groundfish assemblage, as well as numerous other species. Even highly specialized surveys provide information on stocks other than the target stock. For example, the annual scallop dredge surveys are used to provide the scallop abundance data needed for scallop stock assessments, and they also provide data on yellowtail flounder used in the latter's assessment.

Stock assessments are prioritized and scheduled regionally through discussions between the Councils and NMFS Regional Office and Science Center staffs. Priorities are established by evaluating the commercial importance of a stock, the age and quality of the existing stock assessment, and biological characteristics of the stock. Schedules are usually set annually on a three-year rolling basis, and are posted online (see <http://www.sefsc.noaa.gov/sedar/> for an example).

The amount and quality of data has a direct effect on the precision of the stock assessment result. For example, an economic study in Alaska showed that maintaining annual frequency of surveys, compared to slowing to biennial surveys, allowed for rapid detection of increases in stock abundance and tens of millions of dollars in added value of the catch.

How socio-economic data are collected and used

NMFS' socio-economic data collection program directly supports Agency efforts to identify management options that achieve conservation objectives while minimizing impacts to fishery participants. These efforts result in a management strategy that is consistent with the long-term sustainability of the resource as well as the fishery and fishing communities. Underpinning this capability are the economic and sociocultural data collection programs and surveys that provide the information base for meeting statutory mandates for cost-benefit analysis and social impact assessments of regulatory actions (e.g., fishing ground closures, gear prohibitions, effort reductions, catch quotas, etc.). On the commercial side, economic questions are added to logbook programs, observer programs, and permit programs to provide cost-effective survey vehicles in a number of fisheries. This information is used to help estimate the economic value of those fisheries. In other commercial fisheries, NMFS relies upon one-time surveys that are updated periodically but, ideally, within three to five years depending upon survey type. In terms of recreational fisheries, NMFS routinely collects expenditure data from saltwater anglers every five years and conducts occasional surveys of for-hire operations, as well as other angler surveys deemed essential for assessing the economic effects of regulations on this group of stakeholders.

In addition to supporting the required management assessments for implementing stewardship regulations, the socio-economic data are increasingly used to support integrated analyses. For example, BLAST (Bioeconomic Length-structured Angler Simulation Tool) is a fully integrated and dynamic decision support tool for assess-

ing the benefits associated with recreational fishing management options, including changes in bag limits, season length, and rebuilding plans. Initial applications have been to cod and haddock in the Northeast. A key feature of the model is that it integrates recreational fishing behavior with age-structured stock assessment models, enabling NMFS to realistically project future economic and biological conditions. This ecosystem approach to fisheries management provides insight into the short- and long-run effects of alternative fisheries policy on both the economic and biological health of important recreational fisheries.

Socio-economic analyses are then used to evaluate the societal impacts of management options, which enables fishing regulations to be developed that meet requirements to sustain fish stocks while minimizing impacts to employment and economic benefits. The Agency is also working to develop improved methods for balancing the prevention of overfishing against the short-term loss of fishing opportunity.

How Federal funding is being used for data collection purposes
NOAA uses appropriated funds from several budget lines to support its data collection, including the following PPAs:

NMFS:

- Fishery research and management (staff support for all areas)
- National Catch Share Programs (observers and landings data)
- Expand Annual Stock Assessments (surveys and stock assessment support)
- Economics and Social Science Research (social science data and analyses)
- Fishery Statistics (landings data, MRIP, bio-sampling)
- Fishery Information Networks (landings data, MRIP)
- Survey and Monitoring (surveys)
- Reducing Bycatch (observers)
- Enforcement and Observers (observers)
- Cooperative Research (bio-sampling, surveys)
- Regional Studies (surveys)

Office of Marine and Aviation Operations:

- Marine Operations and Maintenance (surveys)

Has the new recreational statistics data program been fully developed and implemented, and does the program meet the goals envisioned by Congress?

Under the Marine Recreational Information Program, revised methods were developed that are being incorporated to substantially reduce sources of error and improve the accuracy of effort and catch estimates based on a combination of telephone, mail, and access point surveys. An improved estimation method was developed and implemented in 2012 to provide more accurate 2004–2011 recreational catch statistics for the Atlantic coast and Gulf of Mexico. In addition, a new sampling design for the Atlantic and Gulf onsite surveys of angler catch was implemented in 2013. These revised recreational data sets have already been incorporated into stock assessments.

The Marine Recreational Information Program has also been working with our state partners—including Florida, North Carolina, and Louisiana—to develop and test new methods that use angler registries to survey anglers for production of trip estimates. Following completion of major pilot efforts underway in calendar years 2012 and 2013, a new survey design to replace the coastal household telephone survey will be selected and implemented, beginning in 2014, for the Atlantic and Gulf coasts. The Marine Recreational Information Program and our partners are also developing and testing a number of other possible improvements to the current suite of surveys, including:

- Implementing electronic reporting and conducting pilot projects to improve sampling for validation in the Southeast Headboat Survey.
- Pilot testing of electronic logbook reporting with dockside validation for the Gulf of Mexico Charterboat fishery.
- Pilot projects to test improved survey designs that reduce sources of potential error and improve survey coverage in Washington, Oregon, and California.
- Development and testing of new survey methods and improved designs that will enhance data collection and catch statistics in Hawaii, Puerto Rico, and the Virgin Islands, and in Atlantic highly migratory species fisheries.
- Development of methods to produce preliminary estimates more frequently than bi-monthly, which will improve in-season management.

How can new technologies help fishery managers achieve better and more timely information for management purposes?

NMFS is continually striving to improve and augment its processes, methods, and programs for commercial fishery data collection and analysis. For example, in the

Gulf of Mexico, commercial landings data are collected in cooperation with the five Gulf states and the Gulf States Marine Fisheries Commission, and are used to track progress toward reaching the Annual Catch Limits of managed stocks. By shifting from paper dealer reports, submitted semi-monthly, to electronic dealer reporting, submitted weekly, more timely data are generated to more accurately project when a fishery will reach the Annual Catch Limit. This will enable commercial fishermen to more efficiently plan their fishing activities, and reduce the risks of exceeding an Annual Catch Limit.

Two fisheries in the Bering Sea-Aleutian Islands Groundfish Fishery Management Plan in Alaska currently employ video compliance monitoring. The technical requirements for these applications are relatively simple; for example, they do not involve complex requirements for species identification or measurements. Under Amendment 80, video monitoring is used by about half of the vessels in the Alaska head and gut catch processor and pollock catcher processor fleets to meet the regulations that ensure that no pre-sorting activities occur prior to observer sampling. The regulations for Amendment 91 to this Fishery Management Plan contain the second electronic monitoring requirement that NMFS has implemented in Alaska. Amendment 91 created Chinook salmon prohibited species catch limits on the Bering Sea pollock fishery for the first time. To monitor the Chinook salmon limits, NMFS is striving for a census, or a full count, of Chinook salmon bycatch in each haul by a catcher/processor and each delivery by a catcher vessel. A camera located in the observer sampling station provides views of all areas where salmon could be sorted from the catch as well as the secure location where salmon are stored, thus allowing observers to comprehensively monitor the salmon bycatch while still performing their other required duties.

Other means of electronic monitoring, including the use of digital video cameras, are currently being transitioned to operations regionally. For example, NMFS—in cooperation with the Pacific States Marine Fisheries Commission and the Pacific Fishery Management Council—will implement video monitoring in the West Coast Groundfish Trawl fishery. The agency is in the process of implementing region-specific video monitoring programs cooperatively with industry partners. Cooperatively developing electronic monitoring systems with local fishermen who work in the affected fisheries is key to ensuring that the systems being developed are practical and will reliably and efficiently provide the needed data. The program's goal is to implement a blended mix of electronic and fishery observer monitoring to provide more cost-effective and timely reporting of fish catches.

NMFS is also striving to conduct more surveys using a number of advanced sampling technologies that can achieve higher standardization and, in some cases, can directly measure fish abundance at each survey location, not just a standardized catch rate. With such information, NMFS will be able to provide more precise and accurate assessments sooner. At present, these technologies are still in the developmental phase, and collecting the data is only the first step toward an assessment. Optical and sonar sensors produce huge volumes of data, and NMFS is just beginning to work on methods to process these data types and bring the results into our assessments. In the future, these technologies will enable greater efficiency and increased accuracy and precision for our assessments, but these benefits will take some years to be realized.

NMFS also expects to develop new and innovative approaches to surveying fish stocks in hard-to-survey areas. For example, we are funding a multi-year research project with an academic partner to explore the use of towed camera arrays for use in surveying reef fishes in the Gulf of Mexico and Pacific Islands. If feasible, shifting to this approach would dramatically increase the effectiveness and efficiency of our reef fish surveys—meaning more science for the dollar. In another example, NMFS scientists are engaged with academic partners to develop improved methods for surveying Atlantic sea scallops. This includes the Woods Hole Oceanographic Institution's towed camera technology and the University of Massachusetts' dropped camera system that uses video stills on scallop beds for analysis.

What are the challenges to ensuring NMFS ability to collect abundance data for stock assessments?

There are a number of challenges to collecting abundance data for stock assessments. I will highlight three. First is the ability to understand the relationship between fish stocks and the environment and determining how that will impact future stock abundance. Given the impacts of climate change, historical datasets are becoming less reliable in predicting future stock productivity. This makes ocean “process” studies increasingly important. Expanded funding requested in a variety of budget lines in NOAA's fiscal year 2014 budget will increase focus on these important studies. The second challenge is finding ways to sample hard-to-survey bottom

types such as coral reefs. Advanced sampling techniques, such as video technology can help and the agency is expanding partnerships to explore these techniques. The third challenge is that the capacity of the NOAA Fleet to support fishery surveys has eroded over time due to increased lifecycle costs of vessels. While advanced sampling technologies offer cost and data collection efficiencies to supplement ship surveys, these systems and moored sensors must be deployed and serviced by the NOAA Fleet, and there are many vital survey operations that still must be conducted by scientists and fishermen working off of the NOAA ships. The fiscal year 2014 President's Budget Request includes an increase for OMAO to provide more Days at Sea and fully utilize the NOAA Fleet assets. This increase would support a utilization rate of about 94 percent—an approximate 40 percent increase over fiscal year 2012.

How can the Act be modified to provide better data collection activities, and how can these activities improve the scientific underpinnings of our current management activities?

The quality of scientific advice provided to management has been a major reason the United States has become a model of responsible fisheries management. Direction provided by the Magnuson-Stevens Act has been crucial to NOAA's scientific program. However, this is not to say that we cannot continue to improve the scientific guidance we provide.

The conference, *Managing Our Nation's Fisheries*—cosponsored by the eight Regional Fishery Management Councils and NMFS—concluded a little over a week ago. The conference focused on three broad themes: (1) improving fishery management essentials, (2) advancing ecosystem-based decisionmaking, and (3) providing for fishing community sustainability. Presentations and discussions that occurred at this meeting frequently focused on the importance of improved scientific advice. We expect to analyze the results of these discussions for guidance on reauthorization of the Magnuson-Stevens Act. These analyses and our continuing discussions with Congress, our partners, and stakeholders should lead to further improvements in our scientific advice under the Magnuson-Stevens Act umbrella.

Thank you again for the opportunity to discuss fisheries data collection programs under the Magnuson-Stevens Act. I am available to answer any questions you may have.

Dr. FLEMING. Thank you, Dr. Merrick.
The Chair now recognizes Mr. Fisher for 5 minutes.

**STATEMENT OF RANDY FISHER, EXECUTIVE DIRECTOR,
PACIFIC STATES MARINE FISHERIES COMMISSION**

Mr. FISHER. Thank you, Mr. Chairman. My name is Randy Fisher. I am the Executive Director of Pacific States Marine Fisheries Commission. The Commission represents the States of Washington, Oregon, Idaho, California, and Alaska. The Commission manages a bunch of large projects that focus on scientific inventory and economic research and data collection. Today I will focus on two data collection activities and I will offer some thoughts on the future of some of the activities that we are involved with.

The first data collection activity I will focus on is the Recreational Fisheries Information Network, or RecFIN. RecFIN is a cooperative effort between the State fishery agencies of Washington, Oregon, California, the Commission, and the National Marine Fisheries Service. The RecFIN data base contains recreational fisheries data from 1980 to the present.

The primary source of this data in the data base comes from sampling programs that are funded by the National Marine Fisheries Service and the State agencies. The survey is spread out over 800 fishing sites on the 3 West Coast States. About 57 percent are in California; 10 percent are in Oregon; and 33 percent in Washington. The number of marine anglers in these States total 1.4 million. Total cost of this program is about \$5.7 million, with the Na-

tional Marine Fisheries Service contributing \$2 million, or about 36 percent of the cost.

Each of these States have marine fishing licenses, with an annual average cost of \$44 and a daily cost of about \$14. A total of about 40 percent of all ocean boat angler trips were sampled in Oregon in 2011. The State of Washington conducted their ocean boat survey and Puget Sound boat survey in 2011. Sampling rates were about 40 percent of all ocean trips. In California in 2011, over 90,000 angler trips were sampled during a 12-month sampling period.

Two States utilize their angler license frame for estimating fish efforts in certain modes of fishing. These include the Puget Sound boat trips in Washington and private access and night boat trips in California. All other modes of fishing in the three States are estimated from direct field counts. Catch information is estimated by month and made available to the three States and the Pacific Fisheries Management Council.

The second data of activity is our Pacific Fisheries Information Network, or PacFIN. This network is the Nation's first regional data program. Data from commercial fisheries occurring in the ocean and off the coasts of Washington, Oregon, Alaska, and California, and British Columbia provided to PacFIN's central data base. PacFIN's central data base includes fish tickets and vessel registration provided by the States and the fisheries agencies. In addition, data sources supply specific species composition and catch by area, developed from the port sampling and trawl books. Best estimates of catch of each of the groundfish species by month, area, and gear type are developed from sources from the National Marine Fisheries Service, U.S. Coast Guard, Alaska Department of Fish and Game, and the Canadian Department of Fisheries and Oceans.

On the West Coast we have 272 federally licensed commercial groundfish vessels; 119 of these are involved in the catch share program. Annual cost of this program is around \$6 million. Historically, the National Marine Fisheries Service has contributed close to \$3 million, or about 50 percent of the cost. However, in 2013, this will be decreased to about \$2.4 million.

Concerning the future of new technology, I will discuss three that we are involved with. First, electronic fish tickets and electronic compliance monitoring. Pacific States Marine Fisheries Commission continues to develop and support expansions of software applications to the current West Coast electronic fish ticket program. eTicket software is provided free to registered fish buyers in all the States, and can capture up to 27 West Coast fish tickets. A web portal was developed to provide download access to software and updated and submitted tickets. In addition, software was developed to simplify the installation process and to automate the process of submitting data directly to a web portal.

The program has been fairly successful. For instance, 23 percent of the fish tickets, representing 70 percent of the pounds, were captured electronically in Oregon. With respect to compliance monitoring program, an electronic data capture application was developed to capture data from plant monitors. This program has been

in place since the beginning of the West Coast catch share program.

Second, electronic log books. In the West Coast, electronic log books are a State requirement for each of the States' set of log books. The exception is the trawl book, or a single log book for each of the States. The Commission is considering adopting one of two electronic log books currently in use, one developed in Alaska and the other in the Northeast.

The third, electronic monitoring cameras. The Pacific States Marine Commission has been very involved in developing the electronic monitoring compliance program in West Coast and Alaska. The program does not replace the current 20 percent biological sampling that has existed on the West Coast for some time. The focus on compliance monitoring is to account for all fish that are caught and those that are discarded.

The goals of this are simple. First, we want to maintain integrity of the existing system to gather biological data. Second, we want to save money for fishermen and management. Third, we want to ensure the compliance of landing and discard data. Fourth, we want to integrate with electronic logbooks. And, fifth, we will look for opportunities to add to stock assessments. We have looked closely at the Canadian system, and it works. Basically, it compares camera footage to a skipper's logbook. Any differences are the basis for further investigation and possible enforcement actions. We are currently comparing observer data to camera images to ensure the confidence of the catch and discards.

The fishermen may have to change how they fish, but the cost savings may be attractive enough to make them change. We still have to work out some examples. For example, what is a discard? We have to work out some enforcement issues. What happens if someone puts a bucket over a camera? And we have to look at costs. If you carry a camera instead of an observer, how much will it cost the fisherman? We have—

Dr. FLEMING. Mr. Fisher, thank you. Your entire testimony will appear in the written record, but you are already a minute over the allotted five.

Mr. FISHER. Sorry.

Dr. FLEMING. So we thank you.

[The prepared statement of Mr. Fisher follows:]

**Statement of Randy Fisher, Executive Director,
Pacific States Marine Fisheries Commission**

Good Morning. My name is **Randy Fisher** and I am the **Executive Director of the Pacific States Marine Fisheries Commission**. The Commission represents the States of Washington, Oregon, Idaho, California and Alaska.

The Commission manages a number of large projects that focus on scientific, inventory and economic research and data collection.

Today I will focus on three data collection activities, and I will offer some thoughts on the future, based on activities in which the Commission are involved.

The **first Data Collection activity** I will focus on is our Recreational Fisheries Information Network or RecFIN.

RecFIN is a cooperative effort between the state fishery agencies in Washington, Oregon, and California, the Pacific States Marine Fisheries Commission (the Commission), and National Marine Fisheries Service (NMFS). The four goals of RecFIN are:

- Develop and implement a State/Federal cooperative program for a coastwide marine recreational fisheries data system;

- Coordinate collection, management, and dissemination of Pacific coast marine recreational fishery data;
- Provide the data in a central location on a timely basis in the format needed to support state and Federal work on Pacific marine recreational fisheries; and
- Reduce and avoid duplication of data collection efforts between RecFIN members.

The data base contains recreational fishery data for the years 1980–89 and 1993 to the present. The primary source of data in the RecFIN data base comes from the following five state sampling programs: Oregon Recreational Boat Survey and the Oregon Shore and Estuary Boats Survey; Washington Ocean Sampling Program and the Washington Puget Sound Boat Survey; and the California Recreational Fisheries Survey. These programs are funded by NMFS along with state agency funding in all three states. The survey is spread out over about 800 fishing sites coastwide in the three states. Of these sites, about 57 percent are in California, 10 percent in Oregon and 33 percent in Washington State.

The number of marine anglers in these states total 1,400,000. Total cost of this program is \$5,700,000 with the National Marine Fisheries Service contributing \$2,000,000 or 36 percent of the cost. Each of these states have marine licenses with an annual average cost of \$43.54 and a daily cost of \$14.24.

Pacific States Marine Fisheries Commission provided partial funding for sampling in Oregon and Washington through the RecFIN. Sampling was conducted by the states. A total of about 40 percent of all ocean boat angler trips were sampled in Oregon in 2011, where sampling occurred from March through October. A pilot survey funded through the Marine Recreational Information Program (MRIP) from National Marine Fisheries Service, allowed for winter sampling and sampling of minor ports that has not been done in a few years. As a result sampling occurred year round in 2011 in Oregon.

The State of Washington conducted their Ocean Boat survey and the Puget Sound Boat Survey in 2011. Sampling occurred throughout the year in Puget Sound and also year round on the coast. Sampling rates were at about 40 percent of all ocean boat trips.

In California, in 2011, over 90,000 angler trips were sampled during the 12 month sampling program.

Two states utilized their angler license frame for estimation of fishing effort in certain modes of fishing. These include Puget Sound Boat trips in Washington and shore and private access and night boat effort in California. All other modes of fishing in the three states are estimated from direct field counts.

All catch and effort information for each sampling month from the various surveys are loaded into the RecFIN data base maintained at PSMFC with a one-month lag time. Detailed explanations of the sampling conducted, sampling methodology and estimation statistics of the various sampling programs along with catch and effort information and estimates by month are available for all three states (Oregon, Washington, and California) and the Pacific Fishery Management Council.

The **second Data Collection activity** is our Pacific Fisheries Information Network or PacFIN. This network is the nation's first regional fisheries data network. PacFIN is a joint Federal and state project focused on fisheries data collection and information management. PacFIN provides timely and accurate data to aid effective management of fisheries and fishery resources.

Data from fisheries occurring in ocean areas off the coasts of Washington, Oregon, California, Alaska, and British Columbia are provided to the PacFIN central data base.

The PacFIN central data base includes fish-ticket and vessel registration data provided by the Washington, Oregon, and California state fishery agencies. In addition the data sources supply species-composition and catch-by-area proportions developed from their port sampling and trawl logbook data systems.

The National Marine Fisheries Service, Northwest Region, supplies the central data base with limited-entry permit data and also incorporated is the vessel data provided by the U.S. Coast Guard. The National Marine Fisheries Service, Alaska Fishery Science Center inputs weekly aggregates developed from their tow-by-tow observer data base.

The data for the Alaska groundfish fishery are provided by the Alaska Department of Fish and Game and the National Marine Fisheries Service, Alaska Region in the form of monthly aggregates, for fish caught in Alaska waters but landed in Washington ports.

The Department of Fisheries and Oceans, Canada also makes a contribution to this West Coast fisheries data system.

The best estimates of catch for each groundfish species by month, area, and gear-type are developed from the source data just-mentioned.

PacFIN staff provides historical landings data since 1981 as well as support with data retrievals, analyses and review of the National Marine Fisheries Service's catch share calculations for the West Coast trawl rationalization/Individual Fishing Quota program. This information is used to provide Quota Shares/Quota Pounds to the fleet.

On the West Coast we have 272 federally licensed vessels, 119 of those are in the Catch Share Program.

The annual cost of this program is has been around \$6,000,000. Historically the National Marine Fisheries Service has contributed close to \$3,000,000 or 50 percent of the cost, however in 2013, this will drop to \$2,400,000.

The **third Data Collection Activity** is our Alaska Fisheries Information Network of AKFIN.

AKFIN was established in 1997 with the goal to acquire and consolidate the vast quantity of data generated by the Alaska fisheries, to provide quantitative analyses and interpretations of these data, and then to disseminate the processed information to fishery analysts, scientists, economists, and other administrative agencies.

AKFIN maintains an extensive data library from which information is used to fulfill data requests. AKFIN provides direct access to much of the information maintained in the data library via a secure connection.

The primary purpose is to provide complex data sets to fisheries analysts and economists to support the Council's decisionmaking process.

AKFIN consolidates the agency data sources into a single, comprehensive data base, applying value-added information to provide a standardized view of the Alaska commercial fisheries data for analytic purposes.

AKFIN supports the data needs of fisheries analysts and economists by consolidating commercial fisheries data and dispensing that data upon request using custom programming service and on-line tools. Information is aggregated from the Alaska Department of Fish and Game, Division of Commercial Fisheries, Commercial Fisheries Entry Commission, National Marine Fisheries Service Alaska Region, Alaska Fisheries Science Center, North Pacific Science Center, North Pacific Fishery Management Council and Pacific States Marine Fisheries Commission.

AKFIN reports catch data, harvest and value from commercial fisheries in Alaska using the best available data from data source agencies. Once these data are incorporated into its system, AKFIN reports information from several critical perspectives, which are used to identify and quantify impacts related to changes in fisheries management. These include species, area, gear, vessel, processor, community, and fishery participants by season.

AKFIN has an online reporting tool that provides authorized stock assessors, social scientists, and economists with direct access to AKFIN's analytical data base and metadata resources. This tool allows users to access prepared reports and to formulate ad-hoc queries that can be saved and shared with other analysts.

Concerning the future and new technology, I will discuss three that we are involved with:

First—Electronic Fish Tickets and Electronic Compliance Monitoring

Second—Electronic Log Books

Third—Electronic Monitoring ũ i.e. Camera's

First—Electronic Fish Tickets and Electronic Compliance Monitoring:

The Pacific States Marine Fisheries Commission continues to develop and support the expansion software applications for the current West Coast Electronic Fish Ticket Reporting and Compliance Monitoring Program. E-ticket software is provided free to registered fish buyers in all here states and can capture data for any of the 27 West Coast tickets. A web portal was developed to simplify creation of reporting organizations and provide download access to software, updated and submitted tickets. In addition, software was developed to simplify the installation process and automate the process of submitting the data. The submission updates shifted data access by email to a direct web-reporting process.

This application has been in use since 2007 when it was adopted by the National Marine Fisheries Service as the official landing records for the whiting fishery. With the introduction of the Catch Shares program in 2011, Pacific States Marine Fisheries Commission (PSMFC) electronic tickets were identified as the official record for all catch share landings.

In 2012 Oregon adopted the PSMFC electronic fish ticket as the official record for all its different fish tickets. Oregon dealers who submit tickets electronically are no longer required to submit paper copies of these tickets. This program has been fairly successful in use. 23 percent of the fish tickets, representing 70 percent of the landed pounds are captured electronically in Oregon.

Washington is next, adopting the electronic ticket for one of its six ticket types. In 2012, electronic tickets accounted for less than 1 percent of the total number of tickets submitted but captured almost 19 percent of the pounds landed.

With respect to the Compliance Monitoring program, an electronic data capture application was developed to capture the data from the monitors and submit it to PSMFC.

This program has been in place since the beginning of the West Coast Catch Shares program.

Second—Electronic Log Books:

On the West Coast, Log Books are a state requirement and each state has its own set of log books. The exception is the Trawl logbooks which is a single logbook adopted by all three states.

In 2008, PSMFC developed an electronic log book at the request of the trawl fleet. Pacific States Marine Fisheries Commission is considering adopting one of two electronic

logbooks currently in use, one developed in Alaska, the other in the Northeast. PSMFC has a grant to adapt the Northeast logbook for use with the highly migratory fleet fishing primarily out of the Southwest.

We believe electronic log books will be a tool in the future especially in IFQ Fisheries. For this to be effective it will require a Federal Log Book program by regulation.

Third—Electronic Monitoring—i.e. Cameras:

Pacific States Marine Fisheries Commission has been very involved in developing an Electronic Monitoring Compliance Monitoring Program for the West Coast and Alaska. This program does not replace the current 20 percent biological sampling program that has existed on the West Coast for some time. The focus is on compliance that is accounting for all the fish that are caught and those that are discarded.

In 2013, we will have cameras on 7 fixed gear boats, 2 whiting boats and 13 trawlers.

Goals:

The goals of the projects are simple. First, we want to first maintain the integrity of the existing system that gathers biological data, second we want to save some money for the fishermen and management, third, we want to insure the confidence of the landing and discard data.

Fourth, we want to integrate with electronic logbooks and,

Fifth, we want to look for opportunities to add to stock assessment interaction.

We have looked closely at the Canadian system and it works. Basically, it compares camera footage to the skipper's log book. Any differences are the basis for further investigation and possible enforcement action.

We are currently comparing observed data to camera images to insure we are confident in accounting for catch and discards.

In order for us to move to cameras the Pacific and North Pacific Councils and the National

Marine Fisheries Service have to be confident that cameras can work.

Fishermen may have to change how they fish.

We will have to work out definitions, i.e. "what is a discard". We have to work out enforcement issues, i.e., "what happens if someone puts a bucket over the camera", and we have to work out cost issues i.e., "if you carry a camera instead of an observer, how much will that cost the fisherman".

We have had many discussions with the fleet, with enforcement, and with the scientists and the bottom line is that these are show stoppers.

Concerning amendments to the Act that could provide better data collection activities, I do not have any specific recommendations.

I believe the Act provides the framework that can result in better data collection.

Our experience has been that better data collection is usually related to better funding.

Dr. FLEMING. Mr. Beal, you are now recognized for 5 minutes.

**STATEMENT OF ROBERT BEAL, EXECUTIVE DIRECTOR,
ATLANTIC STATES MARINE FISHERIES COMMISSION**

Mr. BEAL. Thank you, Mr. Chairman. Good morning, Mr. Chairman and members of the Subcommittee. I am Bob Beal, the Execu-

tive Director of the Atlantic States Marine Fisheries Commission. The Commission was formed in 1942 by the 15 Atlantic coastal States in recognition that they can do more working cooperatively than they can working independently. It is a particular pleasure to appear before the Subcommittee today to comment on data collection issues in relation to the reauthorization of the Magnuson-Stevens Act.

Data provide the basis for the U.S. fisheries management. The Commission alone relies on quality data to support its 25 fishery management programs. Success, in terms of sustainable management, stakeholder confidence, lies in the accuracy, reliability, and timeliness of the data. Given the Atlantic coastal fishery resources generate billions of dollars of economic activity and hundreds of thousands of jobs, it is essential that we continue to invest in the collection and management of high quality and timely data.

The Commission and its member States support various fishery-dependent and fishery-independent data collection methods. Both types are critical for our management process. Fishery-dependent data is collected directly from commercial and recreational fishermen through harvester and dealer reports, observer programs, and broad surveys of the recreational sector. Fishery-independent data provides insights into the status of fish stocks without the biases inherent to commercial and recreational catch information.

The Commission coordinates two regional, independent data collection programs: the South Atlantic component of the Southeast Area Monitoring and Assessment Program, SEAMAP, and the Northeast Area Monitoring and Assessment Program, which is NEAMAP.

The Commission also coordinates several species-specific research activities for horseshoe crab, American lobster, red drum, and northern shrimp.

With regards to how new technologies can improve the management process, I will speak to the program that the Commission knows best, the ACCSP, the Atlantic Coastal Cooperative Statistic Program. In the past 10 years, ACCSP has made significant advances in electronic reporting on the Atlantic Coast. In 2003, ACCSP created the Standard Atlantic Fisheries Information System, or SAFIS. This is an online, electronic reporting system designed to meet the increasing need for real-time commercial landings data.

Over time, the use of SAFIS has expanded throughout the Atlantic Coast to become the de facto dealer reporting system, providing up-to-date landings information. To date, SAFIS includes 4 million dealer records, approximately half-a-million trip records, and 6,700 volunteer angler records.

While the current data collection programs are adequate to support species stock assessments and responsible stewardship, there are opportunities for improvements. Several important State and species-specific surveys have been discontinued or significantly reduced over the past 5 years. We need to restore this survey work and provide dedicated and consistent long-term funding.

One significant example is the horseshoe crab trawl survey that will not occur this year, due to lack of funding. The survey was historically funded by NOAA fisheries, and then through private dona-

tions for the past 2 years. However, the funding is not available for this year's survey. This gap in horseshoe crab data will directly impact the Commission's ability to assess the crab population and establish appropriate harvest quotas. Also, SEAMAP has to reduce sea days and sampling intensity due to level funding and rising costs.

Regarding recreational data collection, the implementation and refinement of the MRIP program, the Marine Recreational Information Program, must be supported by adequate resources and State Federal partnerships. Over the past 5 years, the focus of MRIP has been the development of new methodologies to address the previous survey shortcomings. Now the program is focusing on implementing these new methodologies. As these methodologies are implemented, it is critical that the States and Federal Government work together to implement these new methodologies and evaluate the impact and effect that they have.

MRIP is designed to meet the national standards by providing good precision at a regional level. The survey is not designed to provide robust, State-level recreational harvest estimates. To address this unmet need, many Atlantic coastal States have diverted State funds, ACCSP funds, and Interjurisdictional Fisheries Act funds to support increased MRIP sampling. Support should be provided to MRIP to produce harvest estimates with reasonable precision at each State level.

The ACCSP has made significant progress during the past 15 years. However, as this program continues to mature, resources will be needed to expand its scope and value. ACCSP can be expanded to include fishery-independent surveys to bring both fishery-dependent and independent data into one data warehouse. This will reduce the time and effort needed to conduct stock assessments. This step currently takes many months or longer to complete.

Also, ACCSP can be expanded to include traceability of Atlantic seafood products with the goal of improving economic return for domestic fisheries. This program could be similar to the successful Gulf trace program—Gulf seafood trace program.

In closing, it is important to reiterate that good data supports sound science and informed decisions. We must seek efficiencies in how we collect and manage data, as well as ensure that there is consistent, dedicated funding over the long term. The alternative is more precautionary decisions which lead to foregone harvest and reduced economic returns to the coastal communities and States that depend on them.

I would be pleased to answer any questions when we get to that part of the hearing.

[The prepared statement of Mr. Beal follows:]

**Statement of Robert Beal, Executive Director,
Atlantic States Marine Fisheries Commission**

Chairman Fleming and Members of the Subcommittee, I am Robert Beal, Executive Director of the Atlantic States Marine Fisheries Commission (Commission). The Commission is comprised of the fifteen Atlantic coastal states and carries out a diverse array of programs for its members with the goal of restoring and sustaining Atlantic coastal fisheries. The Commission provides a forum for interstate cooperation on fisheries that cross state borders and thus cannot be adequately managed by a single state. Congress authorized the Commission in 1942; and granted us in-

creased management authority in 1984 with the Atlantic Striped Bass Conservation Act, and again in 1993 with the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic Coastal Act). I hope to be a resource to the Subcommittee as it continues the process of reauthorizing the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

I commend the Chairman for holding the second MSFCMA reauthorization hearing of 2013 on the issue of data collection. Data, both fishery-dependent (as in catch and effort) and fishery-independent (as in data collected through scientific surveys), provide the basis for the marine fisheries management in the United States. The Commission alone relies on data to conduct and assess its 25 fishery management programs. The ultimate success of these programs in terms of sustainable management and stakeholder confidence lies in the accuracy, reliability, and timeliness of the data we use to inform our stock assessments and decisionmaking. Given that Atlantic coastal fishery resources generate billions of dollars of economic activity to the Nation and hundreds of thousands of jobs in our coastal communities, it is essential that we continue to invest in the collection and management of high quality and timely data. Without good data, there is no successful management of America's fisheries.

ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY-RELATED DATA COLLECTION ACTIVITIES

The Commission and its member states support various fishery-dependent and fishery-independent data collection methods, and use data compiled by those methods to conduct stock assessments and develop fishery management plans (FMPs). Fishery-dependent and independent data collection methods and the data that they provide are critical to our stock assessment and fisheries management processes. Operating with insufficient data could cause the Commission and the states to implement overly conservative management measures to address increased uncertainty in landings and population estimates and ensure species sustainability.

Fishery-Dependent

Fishery-dependent data is collected directly from commercial and recreational fishermen through harvester and dealer reports, observer programs, and broad surveys of the recreational sector. The Commission and its member states participate in and use three primary data collection programs: the Atlantic Coastal Cooperative Statistics Program (ACCSP), NOAA Fisheries Commercial Fisheries Statistics, and the Marine Recreational Information Program (MRIP).

ACCSP

ACCSP is a cooperative state-Federal marine fisheries statistics data collection program that integrates data from multiple state/Federal sources into a single data management system to meet the needs of fishery managers, scientists, and fishermen. ACCSP was established to be the principal source of fishery-dependent information on the Atlantic coast. The ACCSP provides data for a number of fisheries management purposes. These include: FMPs, dealer reporting compliance; quota and compliance monitoring; stock assessments; landings history and trends (e.g., track past commercial catch levels by state, revenue data by vessel); quality control against other sources; fisheries characterizations; develop catch-per-unit-effort indices; and fishery participant information (counts of fishermen, dealers, and/or vessels). ACCSP is housed within the Commission but functions separately. The Commission is a partner within ACCSP, and provides administrative and logistical support services to the ACCSP.

NOAA Fisheries, Fisheries Statistics Division

ACCSP created the Data Warehouse, an online data base populated with fishery-dependent data supplied by their program partners. These publicly searchable data are also used by the NOAA Fisheries, Fisheries Statistics Division and compiled as part of the Fisheries of the U.S. data set.

MRIP

MRIP was mandated by the last Magnuson-Stevens Reauthorization to replace Marine Recreational Fishery Statistics Surveys (MRFSS) and improve the collection, analysis, and use of recreational saltwater fishing information. Overseen and conducted by NOAA Fisheries, MRIP is a two part survey comprised of a field intercept component and an effort survey. Field interviews are generally conducted at the end of an angler's fishing trip at fishing access sites, while the effort survey is conducted via telephone interviews to individual households. I will discuss MRIP in greater detail in a following section.

Fishery-Independent

Fishery-independent monitoring provides insight into the status of fish stocks without the biases inherent to commercial and recreational catch information. The Commission coordinates two regional fishery-independent data collection programs in the South Atlantic component of the Southeast Area Monitoring and Assessment Program (SEAMAP) and the Northeast Area Monitoring and Assessment Program (NEAMAP), as well as several species-specific research surveys for horseshoe crab, American lobster, red drum, and northern shrimp.

NEAMAP

NEAMAP is a cooperative state/Federal fishery-independent research and data collection program established in 1998 for the coastal waters from Maine to North Carolina. Its partners include the states from Maine to North Carolina, the Commission, NOAA Fisheries Northeast Fisheries Science Center (NEFSC), the Mid-Atlantic and New England Fishery Management Councils, and the U.S. Fish and Wildlife Service (USFWS). The program was developed to respond to the lack of adequate survey coverage and coordination in the coastal waters of the Mid-Atlantic/Northeast Region. In particular, its Southern New England/Mid-Atlantic (SNE/MA) NEAMAP Nearshore Trawl Survey was designed by scientists and stakeholders to address a void in shallow water sampling created when the Federal trawl survey changed research vessels and decreased sampling coverage in nearshore waters. Piloted in 2006, the SNE/MA Nearshore Trawl Survey is about to complete six full years of surveys. The survey samples inshore waters from Cape Hatteras, North Carolina, northward to Martha's Vineyard, Massachusetts in the spring and fall of each year. As of 2012, the survey has sampled over six million fish, representing 173 species. In total, it has collected over 800,000 individual length measurements and age and diet information for more than 80,000 fish. The survey data complements results from the NOAA NEFSC Trawl Survey, which samples in deeper, offshore waters of the Mid-Atlantic and New England. NEAMAP also includes the Maine-New Hampshire Inshore Trawl Survey, as well as the Massachusetts Inshore Trawl Survey.

In addition, the use of a commercial fishing vessel has enhanced public acceptance of the survey approach. The scientific, industry, and public acceptance of the survey and its results confirm its value. Having successfully completed 13 fishery-independent surveys, NEAMAP has established a solid start to a long-term series of fishery-independent data. With additional years of sampling, NEAMAP will become an increasingly valuable source of fishery-independent data to support and improve stock assessments.

SEAMAP

SEAMAP is a cooperative program that facilitates the collection, management, and dissemination of fishery-independent data in the Southeastern U.S. and Caribbean through long-term surveys. Implemented in the early 1980s, SEAMAP represents one of the longest running fishery-independent data series in the nation. The Commission manages the South Atlantic region of SEAMAP. Partners in SEAMAP-South Atlantic include the state marine fisheries agencies of North Carolina, South Carolina, Georgia, and Florida; the South Atlantic Fishery Management Council; NOAA Fisheries; and USFWS. SEAMAP provides funds to involve regional member organizations in the coordination of fishery-independent sampling activities in light of the fact that no single state or Federal fishery management agency has the resources to meet the objectives of existing management plans alone. SEAMAP's integrated approach to fishery-independent data collection can fulfill priority data needs for the development of FMPs in the Southeast region. The long-term goal is a web-based information system that facilitates data entry, error checking, data extraction, dissemination, and summary of fishery-independent data and information for all ongoing SEAMAP-South Atlantic surveys and special studies. It is envisioned that the data system would be a relational data base for simultaneous access to a number of fishery-independent data programs. Spatial presentations of SEAMAP and other South Atlantic fishery-independent data will be available through a developing regional GIS Service managed by the Florida Fish and Wildlife Research Institute for the South Atlantic Fishery Management Council.

Species-Specific Surveys

The Commission also coordinates a number of species specific surveys along the Atlantic coast, including horseshoe crab, lobster, red drum, and northern shrimp surveys.

The Horseshoe Crab Trawl Survey is the only fishery-independent survey designed to sample the horseshoe crab population in coastal waters. Its data are a crit-

ical component of the Commission's coast wide stock assessment and the newly adopted Adaptive Resource Management (ARM) framework that incorporates both shorebird and horseshoe crab abundance levels to set optimized horseshoe crab harvest levels for the Delaware Bay area.

The American lobster stock was recently evaluated through a stock assessment, and the need for more data on juvenile lobster data was apparent. To address this need, the states of Maine through New York performed a collaborative Ventless Lobster Trap Study from 2006 to 2011. Currently, the study has been discontinued due to a lack of funding.

The Adult Red Drum Longline Survey began in 2006 and covers the waters of North Carolina, South Carolina, and Georgia. The main purpose of the study is to determine annual abundance estimates for the adult offshore component of red drum, a critical but missing ingredient in evaluating the status of the red drum population, especially the adult portion, and developing a successful red drum management program.

An annual trawl survey for northern shrimp is conducted in the western Gulf of Maine each summer aboard the *R/V Gloria Michelle*. The survey is a collaboration of the NEFSC's Ecosystems Survey Branch, the Commission, and biologists from Maine, New Hampshire, and Massachusetts. The survey is a valuable tool for consistently evaluating the stock's condition and forms the basis of the management program's annual specification setting process. It is funded wholly through Atlantic Coast Act funding.

In addition to these broad cooperative surveys, numerous nearshore surveys are conducted by the states. These surveys, which are largely funded by the Atlantic Coastal Act and the Interjurisdictional Fisheries Act, provide critical nearshore fisheries data for use in interstate and regional stock assessments. These surveys include: American lobster sampling in New England; monitoring state quotas of black sea bass, summer flounder, and striped bass in the Mid-Atlantic; and surveying flounders, drum, shrimp and crabs in the South Atlantic.

MRIP

The Commission has participated in the redesign and implementation of MRIP. State marine fisheries agency representatives and Commission staff serve on several MRIP committees (National Registry, Data Management, Operations, Executive Steering Committee) to guide the Program redesign. Committee responsibilities include technical aspects like field survey design and catch estimation methodology, as well as making annual funding recommendations to NOAA Fisheries on priority pilot studies to support. The Commission has taken on an additional role by administering a number of MRIP grants to the Atlantic states to build and maintain state and Federal angler registries (participant information), and field survey site registries (boat ramps, ports, etc. where anglers are interviewed by MRIP). Finally, the Commission also provides a venue for MRIP to communicate progress and receive stakeholder feedback at its quarterly meetings where NOAA Fisheries staff periodically present the latest MRIP developments.

For several recreationally important species managed by the Commission, MRIP data are used to estimate annual and bi-monthly catch levels in order to monitor landings and develop annual regulations. Data are also utilized in a number of Commission stock assessments, again to characterize harvest and discards, the sizes and ages of fish caught recreationally, and as indices to track trends in stock abundances.

Despite the Commission's reliance on MRIP data and its involvement in the Program redesign, the states and Commission share continuing concerns about the implementation and utility of the recreational survey and resulting data. A primary concern is the high magnitude of uncertainty in the catch estimates. This uncertainty undermines stakeholder confidence and the ability of fishery managers to make informed decisions.

Finally, the pace at which MRIP is progressing has been slow. Following the 2006 National Research Council review of the old recreational survey program (MRFSS), it has taken several years to conduct pilot studies, perform follow-up studies, independently peer review the results, and complete the logistical, legal, and information management steps needed in order to implement the new field survey and catch estimate methodology. Until very recently (this year), the Commission and the states continued to use MRFSS estimates for its fisheries management planning.

With ever decreasing funding levels for fisheries management and data collection, the ACCSP has been increasingly relied on to provide funding support for MRIP improvements. Since 2008, ACCSP has committed over \$2.6 million to projects that seek to achieve sufficient precision at the state level. MRIP is designed to meet Federal standards by providing good precision at a regional level (Regional Fishery

Management Council). Unfortunately, this Federal standard falls far short of what the Commission and states require to meet stakeholder demands for state-specific regulations.

CURRENT DATA COLLECTION PROGRAMS AND THE ROLE OF NEW TECHNOLOGIES IN IMPROVING THE MANAGEMENT PROCESS

With regards to how new technologies can help fishery managers achieve better and more timely information, I will speak to the program that the Commission knows best—the ACCSP. In the past ten years, the ACCSP has made significant advances in electronic reporting on the Atlantic coast. In 2003, ACCSP created the Standard Atlantic Fisheries Information System (SAFIS), an online electronic reporting system designed to meet the increasing need for real-time commercial landings data. In 2004, NOAA Fisheries Northeast Region adopted SAFIS for federally permitted seafood dealers, encompassing dealers from Maine to North Carolina. Over time, the use of SAFIS has expanded throughout the Northeast (implemented by Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut), the Mid-Atlantic (New York, New Jersey, Delaware and Maryland) and South Atlantic (South Carolina and Georgia) to become the de-facto dealer reporting system.

Initially developed as a dealer reporting system, SAFIS has grown to include five distinct applications, and not just for commercial landings, but also recreational. These five SAFIS applications (eDR, eTRIPS, e-1 Ticket, eLogbook, and SMS) function independently, but all are maintained within the same data base and share standards and codes that are ACCSP compliant. To date, SAFIS includes over four million dealer records, approximately 465,000 trip records, and over 6,700 volunteer angler records.

In 2010, ACCSP launched a completely revised version of SAFIS. Staff and program partners listened to the needs of users for the updated system to be faster and more flexible. Some of the major enhancements included the ability to collect highly migratory species data; a much faster interface; automatically generated pricing information; flexibility in creating favorites (species, gear, fishermen, dealers, disposition); and overall improved reporting capabilities.

Benefits SAFIS provides to the state, regional, and Federal partners on the Atlantic coast include:

- Up-to-date information on species caught and their impact on fisheries and quotas;
- Confidential access to data-of-record by fishermen and dealers;
- Access to state and Federal reporting requirements through online data entry that eliminates duplicative reporting;
- Integrated highly migratory species reporting;
- Automatically generated pricing information;
- Flexibility in creating favorites (e.g., species, gears, fishermen, dealers, and disposition) so reporting is quick and easier than ever; and
- Management tools to facilitate maintenance of partner-owned data such as participants, online permits, and vessels.

Below is a description of each of the SAFIS applications, as well as the partners that are implementing the application as of February 28, 2013.

1. Electronic Dealer Reporting (eDR)

The electronic dealer reporting application was the first application developed and implemented. It was first launched in the Northeast Region for Federal fisheries. This application is now employed by Maine, New Hampshire, Massachusetts, Rhode Island (the first state to implement eDR), Connecticut, New York, Delaware, New Jersey, Maryland, and NOAA Fisheries and SE. Fields that must be entered for a completed report include fisherman, port, date landed, time landed, date purchased, vessel number, species, disposition, gear, quantity, and price.

2. Electronic Trip Reporting (eTRIPS)

eTRIPS was developed to meet the complex needs of collecting catch and effort data from fishermen. This application is now employed by Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Maryland. These trip reports, or log books in some fisheries, provide catch and effort data from a permitted fishing entity (fishermen or a vessel) or a single vessel. Trips may be categorized as commercial, party/charter, or recreational.

This application allows fishermen to create trip reports after entering in the required fields in the trip, effort and catch categories. Similar to the eDR application, interactive reports can be made to illustrate progress and history of catch and effort.

Currently the ACCSP is engaged in developing a Mobile App version of the eTrips system designed to run on tablet computers and smart phones. This should greatly

reduce the reporting burden on fishermen, improve data accuracy, and result in timelier reporting.

3. Voluntary Recreational Logbooks (eLogbook)

eLogbook was first developed as a part of the Striped Bass Bonus Program in New Jersey. This application is now employed by Massachusetts, Rhode Island, New York, Connecticut, and Delaware. This application is a powerful way to empower anglers in the data collection process. eLogbook formulates summaries of information on all species caught by the angler. This valuable tool is a way to provide narrow strategies for any given set of conditions and is a more efficient way for anglers to take a look at the past and save the daily entries.

4. Single Trip Ticket Reporting (e-ITicket)

South Carolina, Georgia, and NMFS—SE are currently employing the e-ITicket application. e-ITicket combines elements of both trip (vessel and/or fisherman) and dealer reporting into a single application that emulates the standard practice in the southeast.

5. SAFIS Management System (SMS)

SMS is a web-based application providing administrative tools to SAFIS administrators for management of information such as user accounts, participants, or permits. It is often used to monitor quotas.

Where electronic reporting has been comprehensively deployed, much of the need for more timely and accurate data in dealer and fisherman reporting has been resolved. Agencies that are using the system are better able to manage quotas and perform compliance monitoring. Improved data on the activities of individual license holders will make the creation and management of limited entry fisheries, when desired by the states, much more timely and accurate. The standardization of coding has greatly reduced the amount of time needed to create the consolidated data sets that are needed for larger scale management and assessment activities.

However, many agencies still are using a mixture of conventional (paper) reporting and electronic reporting. Where this occurs, it becomes impossible to have data available in anything like the timeframe that an all electronic solution provides. The data are limited by the slowest mechanism, paper. Paper reports can take several months or longer to receive and process. While they are in process, it's necessary for managers to estimate catch that is reported on paper. This can lead to errors that can have a negative impact on the fisheries and those that prosecute them.

The SAFIS system is designed specifically to be expandable so long as data are reported within the ACCSP standard. SAFIS can be deployed to its partners at no direct cost. It is estimated that coastwide SAFIS results in as much as \$10 million in cost avoidance for data management and software development.

RECOMMENDATIONS FOR IMPROVEMENTS

While many of the current fishery-dependent and fishery-independent data programs are adequate to support species stock assessments and responsible stewardship, there is opportunity for improvements. As stated earlier, sound fisheries data is the foundation of robust fisheries science and management, as well as stakeholder confidence.

The recommendation for improvements would be to provide funding opportunities to restore the state survey work that has been discontinued or significantly reduced over the past five years. The species-specific surveys require dedicated and predictable long-term funding. These surveys are for important species such as American lobster, red drum, and horseshoe crab. The most stark example is the Horseshoe Crab Trawl Survey that will not occur this year due to lack of funding. This survey was historically funded by NOAA Fisheries and then through private donations for the past two years. This gap in horseshoe crab data will directly impact the Commission's ability to assess the crab population and establish appropriate harvest quotas.

Regarding recreational data collection, the implementation and refinement of MRIP must be supported by adequate resources and state/Federal partnerships. Over the past five years, the focus of MRIP has been the development of new methodologies to address survey shortcomings. Many of the new methodologies have been implemented on a small scale through various pilot studies. As these methodologies are implemented along the Atlantic coast, MRIP staff and the states need to be in close coordination to address any issues that may arise.

As noted earlier, MRIP is designed to meet Federal standards by providing good precision at a regional level (Regional Fishery Management Council). The survey is not designed to provide robust state level recreational harvest estimates. To address this unmet need, many Atlantic coast states have diverted state, ACCSP, and Inter-

jurisdictional Fisheries Act funds to support increased MRIP sampling. These diverted funds reduce the states' ability to collect other critical fisheries data. Support should be provided to MRIP to produce harvest estimates with reasonable precision for each state along the coast.

The ACCSP has made significant progress during the past 15 years, however, the program still requires additional funding to become fully operational coastwide. The ACCSP has made significant progress during the past 15 years. As this program continues to mature, resources will be needed to expand its scope and value to fisheries managers and scientists. ACCSP can be expanded to include fishery-independent surveys to bring both fishery-dependent and independent data into one data warehouse. This will reduce the time and effort needed to conduct stock assessments by allowing scientists to access the majority of fishery data in one warehouse. This step currently takes many months or longer to complete. Also, ACCSP can be expanded to include traceability of Atlantic seafood products with the goal of improving the economic return of domestic fisheries. This program could be similar to the Gulf Seafood Trace program that has successfully implemented by Gulf States Marine Fisheries Commission.

SEAMAP has been level funded since 2009 despite increasing fuel and other operational costs for on-the-water surveys. The result, in most recent years, has been cutbacks in days at sea and sampling intensity, which over the long-term can decrease the value of SEAMAP data and accuracy of stock assessments for South Atlantic species. Additional funding could also be used to initiate new surveys for pelagic species, plankton, and crustaceans to address information gaps currently inhibiting stock assessments of several species like wahoo, bluefish, and blue crab in the South Atlantic. SEAMAP partners have formally outlined new survey designs and budgets, if funds become available.

In closing, it is important to reiterate that good data supports sound science and informed decisions. We will never fully understand every detail of the complex marine environment; however, we can improve our understanding to ensure the responsible stewardship of the shared Atlantic coast fisheries resources. The lack of resolution in fisheries science leaves prudent managers with the need to make more precautionary decisions. These decisions can lead to forgone harvest and reduce the economic returns to the coastal communities and states that depend on them. The Commission looks forward to working closely with you, our other Federal partners, and our stakeholders to ensure timely and complete data is collected to support successful fisheries management. I would be pleased to answer any questions you or the Committee might have.

Dr. FLEMING. Thank you, Mr. Beal.

And finally, Mr. Donaldson, you are recognized for 5 minutes.

STATEMENT OF DAVID M. DONALDSON, INTERIM EXECUTIVE DIRECTOR, GULF STATES MARINE FISHERIES COMMISSION

Mr. DONALDSON. Thank you, Mr. Chairman, Subcommittee members. And I appreciate the opportunity to provide testimony about the Gulf Commission's data program activities and issues. I also want to take the opportunity to thank you for all your past support for these critical activities, and hope it continues in the future. As mentioned, my name is David Donaldson. I am the Interim Executive Director of the Gulf States Marine Fisheries Commission, as well as the data program manager.

The Commission was established by Congress in 1949 and is an organization of the five Gulf States. Its objective is the conservation, development, and full utilization of fisheries resources in the Gulf of Mexico. The Commission has been collecting data cooperatively with the five Gulf States and NOAA fisheries since the early 1980s. It believes that quality data is the cornerstone to sound management of our natural resources. Without these key data, it is very difficult to make the necessary decisions.

The Commission coordinates four major areas of data collection that I will highlight. But before I do, it is important to point out

that while the Commission oversees these activities, the States are the actual collectors, the ones out in the field getting their hands dirty collecting this information.

The first program is the Fisheries Information Network, or GulFIN. It is a cooperative program and collects catch effort and biological data from the recreational fisheries, via the Marine Recreational Information Program, and the commercial fishermen via the State trip ticket programs. These data provide baseline information for assessments of in-shore and off-shore species. And without these data, effective assessments cannot be conducted.

I mentioned MRIP, which is still being implemented and is not fully developed. In the past, the emphasis has been on new methodologies and there is a desire in the Gulf to focus more on implementation affecting real change and improving the recreational data in the Gulf.

One area that needs to be explored is new and innovative data collection tools, such as iSnapper. These tools have the potential to improve the timeliness of the data. And not only that, but it creates buy-in from the community, which is critical in the recreational fisheries to restore confidence in the data.

While these tools are important, it is critical that the underlying methods utilized are statistically valid to ensure that data are usable and leads to improved assessments.

Another long-term program coordinated by the Commission is the Southeast Area Monitoring Assessment Program, or SEAMAP, which collects long-term standardized fishery independent data in the Gulf of Mexico. SEAMAP is the only region-wide mechanism for support—or for monitoring the status of populations and habitat. Fishery-independent data is becoming more and more critical in stock assessments, due to the regulations and restrictions placed on commercial and recreational fishermen. Therefore, the fishery-independent data are needed to tune the stock assessment models, which leads to better and more accurate results of those assessments.

One of our newer programs is our economic data program that provides economic performance and contribution data of the fisheries in the Gulf, as well as assesses the economic effects of management decisions for those fisheries.

And the last program is our sport fish restoration program, which focuses on issues related to monitoring of artificial reefs and invasive species.

All these programs provide critical data for sound management of the resources in the Gulf of Mexico. And while these programs have made great strides in improving the available data, it has been an uphill battle securing adequate funding for these activities. There have been several issues that we have been contending with, including not realizing full program funding, which has resulted in data gaps; funding cuts leading to the reduction of critical data; and probably the most damaging is level funding, resulting in the deterioration of core activities.

For example, GulFIN has been level-funded for the last 10-plus years, SEAMAP for the last 5 years, and our economic program has never received any long-term funding. So without dedicated fund-

ing, it limits the managers' abilities to effectively deal with the resources and make sound decisions.

Again, thank you for the opportunity, and I will answer questions when appropriate.

[The prepared statement of Mr. Donaldson follows:]

**Statement of David M. Donaldson, Interim Executive Director,
Gulf States Marine Fisheries Commission**

INTRODUCTION

Established by both state and Federal statutes in July 1949, the Gulf States Marine Fisheries Commission (Commission) is an organization of the five states (Texas, Louisiana, Mississippi, Alabama, and Florida) whose coastal waters are the Gulf of Mexico. It has as its principal objective the conservation, development, and full utilization of the fishery resources of the Gulf of Mexico to provide food, employment, income, and recreation to the people of the United States.

The Commission has been collecting data cooperatively with the five Gulf States and NOAA Fisheries since the early 1980's. It believes that the cornerstone to sound management of natural resources begins with the collection of sufficient, long-term quality data. In addition, adequate resources need to be allocated toward these activities to ensure that necessary information is available to fisheries managers. Over the years, funding levels have stagnated for these fisheries programs which has led to a decrease in quality data and made it more difficult to manage these important resources. The Commission has four major areas of data collection that will be highlighted.

Gulf Fisheries Information Network

The Fisheries Information Network (GulfFIN) is a state-Federal cooperative program to collect, manage, and disseminate statistical data and information on the commercial and recreational fisheries of the Southeast Region. It is intended to coordinate marine commercial and recreational fisheries data collection and data management activities through cooperative planning, innovative uses of statistics and design, and consolidation of appropriate data into a useful data base system.

Recreational data

This recreational component provides for the NOAA Fisheries Marine Recreational Information Program (MRIP) dockside surveys in Louisiana, Mississippi, Alabama, Florida and Puerto Rico for shore, for-hire, and private modes. MRIP was created through a review and some adjustments to the Marine Recreational Fisheries Statistics Survey, or MRFSS, which has been in place since the 1970s. MRIP is designed to meet two critical needs:

1. Provide detailed, timely, and scientifically sound estimates that fisheries managers, stock assessors and marine scientists need to ensure the sustainability of ocean resources.
2. Address stakeholder concerns about the reliability and credibility of recreational fishing catch and effort estimates.

The Commission has provided coordination of the dockside angler surveys for Louisiana, Mississippi, Alabama, and Florida since 1998 and is also responsible for converting data into an electronic format and providing quality control methods prior to delivering data to NOAA Fisheries. These dockside survey data are used to estimate angler catch rates using MRIP methodology. The states also conduct weekly telephone calls to charter boat captains in Louisiana, Mississippi, Alabama, and Florida to obtain estimates of charter boat fishing effort. NOAA Fisheries uses this survey data to produce expanded estimates of catch, landings, and effort.

The implementation of MRIP is still ongoing and is not fully developed at this time. In the past, there has been an emphasis on testing new methodologies and there is a need to implement these methods so real improvement of the data can be realized. Several major changes in program design have been implemented that are improving the accuracy of recreational fishery landings estimates. Landings from 2004–2012 have been re-estimated using new modeling techniques that will provide stock assessment scientists with better and more accurate numbers. MRIP is beginning to utilize data from state angler license data bases to make effort surveys more efficient in contacting marine recreational anglers. Additional research is ongoing and will test new data collection tools (such as iSnapper) that could improve the timeliness and accuracy of data using online or electronic reporting instruments.

Innovative tools like iSnapper can potentially improve the timeliness of the data but also involve the fishing community which creates buy-in to the process. It is important to note that while these tools can be useful, the underlining collection methods need to be statistically valid in order to make the data useable. These changes, and additional ongoing research, have laid the foundation for further recreational survey enhancements in the coming months and years.

Texas Parks and Wildlife Department (TPWD) also collects data from the recreational fishery in coastal inshore and Gulf waters. TPWD has been collecting data from shore anglers and private boat anglers since 1974 using a dockside angler interview survey. TPWD has been collecting data from the for-hire fleet since 1983. TPWD collects similar landings data for key management species, like MRIP, with the only major difference being TPWD does not collect data on discarded catch. Data from TPWD recreational surveys are provided annually to NOAA Fisheries and are used along with the MRIP data for fishery management decisions in Gulf waters.

Biological data

Since 2002, GulfFIN has also coordinated a biological data collection program that focuses on collecting ageing structures from priority species in the recreational and commercial fisheries to address data needs identified by stock assessment scientists. Sampling is designed to statistically collect random length-frequency measurements, age, sex, and reproductive information to aid in stock assessments. All states in the Gulf of Mexico participate in this activity and data for key species such as red snapper, king mackerel, greater amberjack, and gray triggerfish have been provided for past and ongoing stock assessments. Due to a lack of funding, the GulfFIN biological sampling program is likely going to end in 2014. That would break a 10 year time series of ageing data that has been repeatedly utilized by stock assessment scientists for key management species in the Gulf of Mexico.

Commercial data

The commercial component of GulfFIN is a trip-ticket data reporting system that is utilized by Texas, Louisiana, Mississippi, Alabama, and Florida. This system collects commercial landings reports submitted by commercial finfish dealers when commercial fishermen complete their trips. GSMFC provides coordination of data reporting and warehouses copies of the clean state data at GSMFC. These electronic landings data are accessed by NOAA Fisheries and are utilized in analyses by stock assessment scientists at the state and Federal level. In recent years, an electronic trip ticket reporting system has been offered as a reporting tool for commercial dealers. The electronic system provides data in a timelier manner and allows for additional data quality control when dealers are filling out landings reports.

Data Management System

All of the commercial and recreational data collected by GulfFIN are housed by GSMFC using the GulfFIN Data Management System (DMS). The GSMFC uses the DMS to maintain marine commercial and recreational fisheries data to accommodate fishery management/research and other needs in the Gulf of Mexico, Southeast and Caribbean. The DMS is designed using standard protocols and documentation for data formats, input, editing, quality control, storage, access, transfer, dissemination, and application. The GSMFC maintains historical and current year's data in the system and provides support to outside users of the system. In addition to the commercial data, regular loads of recreational and biological data into the DMS are accomplished.

Funding Issues

Originally the GulfFIN program was proposed as a \$7 million dollar project to accomplish all of the intended goals. Despite receiving only half of the proposed funding, GulfFIN has accomplished many significant goals like coordination of the MRFSS/MRIP, commercial trip ticket programs in all Gulf States, and a successful biological sampling program. For the past several years, GulfFIN has received level funding even though the cost of sampling and collecting data has increased significantly. Appropriating additional funds for the GulfFIN program will become essential for continuing these essential base recreational and commercial data collection programs.

Southeast Area Monitoring and Assessment Program

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/University program for collection, management, and dissemination of fishery-independent data and information in the southeastern United States. SEAMAP is a cooperative program whereby Texas, Louisiana, Mississippi, Alabama, Florida, South Carolina, North Carolina, Georgia, Puerto Rico, the U.S. Virgin Islands, the

United States Fish and Wildlife Service, and the National Marine Fisheries Service (NMFS) jointly plan and conduct surveys of economically significant fish and shellfish and the critical habitats that support them. The main goal of SEAMAP is to collect long-term, standardized, fishery-independent data on the condition of regional living marine resources and their environment.

SEAMAP has sponsored long-term (1982 to present) and standardized research vessel surveys that have become the backbone of fisheries and habitat management in the region. The long-term dataset obtained through SEAMAP surveys provides the only region-wide mechanism for monitoring the status of fish populations and habitats. Through its cooperative nature, SEAMAP has the ability to sample the entire coastline from North Carolina through Texas during the same time period and describe the distribution and abundance of fish populations throughout their range in order to better evaluate the status of recreational and commercially utilized fish stocks.

Current SEAMAP surveys in the Gulf of Mexico include an annual spring and fall plankton survey, a biannual winter plankton survey, a reef fish trap/video survey, a reef fish hook and line survey, a summer and fall shrimp and finfish trawl survey, and an inshore bottom longline survey.

One of the primary roles of SEAMAP is the collection of data for stock assessments of marine resources. All of the surveys described above are designed to address this objective. The problem with current data collection is that we have limited resources (funding, personnel, vessel availability, infrastructure, etc.), and there is little potential to collect additional data without additional resources. Over the next decade, SEAMAP will continue to add to the existing data time series, collecting as much new information as possible to improve stock assessments, and will expand efforts to collect the types and volume of data required for adequate assessment of environmental perturbations or damages.

Plankton Sampling

Plankton and environmental sampling are carried out during dedicated plankton surveys and on other resource surveys (trawl) at predetermined stations arranged in a fixed, systematic grid pattern across the entire Gulf of Mexico. Most but not all stations are located at ~56 km or ½ degree intervals along this grid. Sampling is conducted primarily within 0.5 to 1m of the ocean surface and down to a maximum depth 200 m (or to within 2 to 5 m of the bottom) with standard SEAMAP neuston and bongo nets, respectively. Physical oceanographic data (temperature, salinity, fluorescence, oxygen) are collected at each station and chlorophyll measurements are taken at three depths.

The original plan for SEAMAP plankton surveys called for seasonal (quarterly) Gulf-wide surveys over both continental shelf (10–200 m depth) and open ocean waters (>200 m to the EEZ). This goal has never been achieved and, as a result, SEAMAP plankton surveys have yet to encompass the spawning seasons and spawning habitats/areas of all Gulf of Mexico species. The most significant sampling and data deficiencies are open ocean waters in summer, fall and winter months; shelf waters during spring; and the west Florida shelf in summer and fall months. The importance of these data deficiencies were obvious when researchers tried to respond to the Deepwater Horizon oil spill.

Data from expanded Gulf-wide monitoring and early life history studies would fill major gaps in our knowledge of fish and invertebrate spawning seasonality and early life histories. The expansion of sample and specimen analyses would fill major data gaps and, in many cases, first ever data on developmental stages, species-specific vital rates (age, growth and mortality) and trophic dynamics. These data, in conjunction with other data collected during current and expanded surveys, would provide a more complete and detailed picture of the Gulf of Mexico ecosystem. Information would be used to develop ecosystem models for the Gulf of Mexico, as well as providing a baseline for any future ecosystem impact assessments.

Reef Fish Sampling

The SEAMAP Reef Fish Survey provides indices of the relative abundance of fish species associated with topographic features located on the continental shelf of the Gulf of Mexico from Brownsville, TX to the Dry Tortugas, FL at depths between 9 m to 150 m. The survey is conducted annually between the months of April to August, during the snapper spawning season. The number of camera sites sampled annually has ranged from 125 to 490. Video cameras are used as the main sampling gear because trawls and bottom longlines snag on the sea bed, other gear types are highly selective, and the area sampled is too deep for SCUBA divers. Stationary video cameras are non-destructive to sensitive reef habitat, and are relatively non-selective of reef fish species. Fish traps are used to capture fish for aging and repro-

ductive studies. The SEAMAP Vertical Line Survey uses bandit reels to sample reef fish over natural hardbottom, artificial reefs, and around oil and gas platforms. Bandit gear is highly selective in that it does not catch all species of fish that may be present at a location.

Enhancement of current reef fish sampling activities would include: 1) increasing the sampling effort (both spatial and temporal coverage) for the SEAMAP Reef Fish Survey, and 2) increasing biological sampling in all survey activities to improve age and growth information. In addition, the SEAMAP Vertical Line Survey of oil/gas platforms and natural reef habitats using bandit reel sampling gear and side scan sonar would be expanded to improve data on red snapper and other reef fish species. These enhancements would help reduce the variance of species-specific data and also provide age and growth information on age 2–5 red snapper which are under sampled in all other SEAMAP surveys.

Trawl Sampling

The current SEAMAP groundfish trawl survey is conducted semi-annually in the summer (June-July) and fall (October-November). A 42-ft shrimp trawl is used to collect specimens from Brownsville, TX to Key West, FL in 5 to 60 fm of water. Due to funding limitations, areas off southwest Florida are not sampled in the fall. The trawl is towed for 30 minutes, and catch is either worked up in its entirety or is subsampled if the catch is over 22 kg. During the trawl surveys, plankton samples are also collected using a 61 cm bongo frame and 0.335 mm mesh net and/or a 1×2 m Neuston frame with a 0.947 mm mesh net.

Future temporal and spatial expansion of trawl surveys would improve the precision of estimates for all species, as well as provide coverage for Florida waters that are not sampled currently during the fall season. The expansion of biological sampling (i.e., stomach content, and age and growth analyses) would improve the stock assessments for those species sampled, as well as provide a basis for trophic and predator-prey analyses. This information is essential for the development of multi-species and integrated ecosystem assessments.

Bottom Longline Sampling

SEAMAP currently employs an Inshore Bottom Longline Survey to monitor coastal shark and adult finfish populations in the near shore waters of the north central Gulf of Mexico. This nearshore survey complements the NMFS bottom longline survey using the same gear and methodology except that it takes place in the shallow waters of the north central Gulf of Mexico.

Several enhancements could be incorporated into current bottom longline surveys that would expand the scope of bottom longline sampling and provide important data needed for better understanding the dynamics of upper level predators and other key managed species (snappers and groupers). Expansion of the summer bottom longline survey activities would improve precision associated with indices of abundance used for stock assessment. The additional activities would also result in an increased ability to examine spatial patterns in intraspecific differences in the life history, diets, abundance and movements of predatory fishes in the Gulf of Mexico.

Baitfish Sampling

SEAMAP currently does not sample specifically for baitfish. Baitfish form the basis of the marine food web in the Gulf of Mexico. A pelagic bait survey would collect information on Gulf menhaden (*Brevoortia patronus*) and similar pelagic baitfish species as a measure of estuarine productivity for ecosystem and stock assessment analysis. The approach would employ a number of separate state-based fishery-independent projects to address concerns. Increasing existing seine sampling by state partners spatially and temporally would decrease variability in the data. A push-net survey could be conducted to compare existing seine data for the application of the push-net data as an index of abundance in future stock assessments. Genetic samples could be analyzed from the seine and push-net studies to validate species identification and determine frequency of co-occurrence by location. Finally, fish scales for aging purposes could be collected from fishery-independent surveys to determine the age structure across the range of the species from the fishery-independent samples to begin comparison with the fishery-dependent age composition data which has been collected since the late-1970s.

Collection of Ecosystem Data

Increased collection of environmental and ecosystem information through fishery-independent sampling in the Gulf of Mexico would provide a wealth of data that can be used to expand single species stock assessments. More importantly, these data would provide crucial inputs to the development of integrated ecosystem as-

assessments for this region. Understanding spatio-temporal patterns of species distribution is central to managing the Gulf of Mexico's marine populations, communities and ecosystems. Spatio-temporal patterns of species distribution can be directly related to differences in vital rates (e.g., growth, mortality and fecundity), as well as inter-specific interactions (e.g. competition and predation).

Additional Fishery Independent Data Collection Activities

In addition to SEAMAP activities, the Gulf States collect additional fishery independent data to improve the quality of data available for stock assessments. The amount of appropriation provided to the states to support their fishery monitoring programs are determined by a formula based on a state's total marine fisheries landings. Historically, the Gulf of Mexico has had three 'maximum' states by fisheries volume and value. This funding, prior to its elimination by NOAA in 2012, supported the five Gulf States' long-term, fishery-independent monitoring programs which are used to gauge the health of various commercially and recreationally important fish stocks. The value of this monitoring data is critical and the ability of the Gulf States' marine agencies to conduct stock assessments of near-shore and off-shore species hinges upon the quality and duration of these datasets and will be critical to future regional management success.

Economic Data Program

Most fisheries management decisions are made primarily utilizing biological data. While this data is useful in describing the state of the biomass, or stock of the fishery, they do not describe the economic elements such as employment, business performance, or contribution of a fishery to the economy. Existing economic data for commercial and recreational fisheries in the U.S. Gulf of Mexico (Gulf) for state and Federal waters have often been, and in some cases still remain, piecemeal, outdated, and not fully relevant to fisheries managers and recreational and commercial stakeholders.

This void of economic data has been challenging in the Gulf given recent hurricanes, manmade disasters such as Deepwater Horizon, severe floods, unprecedented long-lasting drought and the increase in complex fishery management decisions that require economic analysis as mandated through various state and Federal laws. For example, through the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Executive Order 12866, and the National Environmental Policy Act, etc., Federal agencies, such as NOAA Fisheries, are mandated to perform economic analysis when changes to fisheries management policies are proposed. Through these legislative actions, attempts are made to determine the effects that possible adjustments to management policies might have on fisheries stocks and local and regional economies. An assessment of possible fisheries actions, however, requires reliable and current economic data in order for economic models of specific fisheries and multistate economies to be built. The availability of economic data is, therefore, one of the most significant building blocks to conducting economic and policy analysis.

In an effort to improve data collection and fisheries management of the recreational and commercial fisheries in the Gulf, an Economic Data Program was formed in 2008. Funding for this effort currently ends in 2014. The Economic Data Program is a cooperative partnership among Texas, Louisiana, Mississippi, Alabama, Florida, the Gulf States Marine Fisheries Commission (Commission), and NOAA Fisheries. The program monitors the economic performance and contribution of prioritized fisheries of the Gulf and contributes to the assessment of the economic effects of fishery management decisions on specific fisheries and regional economies. In conjunction with the Gulf Fisheries Information Network (GulfFIN), the Commission coordinates, plans, and conducts specific economic data collection projects throughout its five member states.

Current Economic Data Collection Activities

Projects that are currently underway, or have been completed since the conception of the program, include an economic survey of the inshore shrimp fleet, a marine angler expenditure survey, an economic survey of fishing related businesses (processors and dealers), a marine recreational use economic survey, and a valuation of recreational species survey. Results from these surveys primarily aid in the development of economic business performance analysis, economic contribution analysis using regional input-output models, and evaluation of the potential economic effects from proposed fishery management alternatives. Additionally, the analysis can be used to understand the economic impacts from natural and manmade disasters. It is the intent that the collection of dependable economic data will further maximize the economic benefits of fisheries resources while reducing the negative costs to fishing communities in the Gulf.

Inshore Shrimp Fleet

Cited as one of the most valuable fisheries within the United States, the Gulf commercial shrimp fishery constitutes fishing pressure from both an offshore fleet and an inshore shrimp fleet. Following recent data collection efforts conducted by NOAA Fisheries for federally permitted vessels that harvest shrimp in waters offshore, the Commission has been in the process of providing the first systematic economic analysis of an important economic segment—the inshore shrimp industry—which had not previously been examined with such depth and rigor. This has been accomplished through two annual multi-state economic mail surveys aimed at collecting information on revenue, operating costs, annual expenditures, employment data, and vessel characteristics of the inshore shrimp fleet. This information has been used to determine the economic performance and the economic contributions the inshore shrimp fleet has on regional sales, income, and employment in the Gulf. The information gathered has also contributed to more informed decisionmaking on a variety of commercial fishing policy decisions and issues such as the recent Seafood Compensation Program through the Deepwater Horizon Settlement Agreement.

Fishing-related Businesses

As fisheries management policies change, the economic impacts of these actions extend past commercial fishing fleets to supporting fishing related businesses. Understanding the linkages between specific fisheries industries and the regional economy can be helpful in determining the potential impacts of management decisions. The Commission has, therefore, been in the process of collecting economic data to determine the economic performance and the economic contributions that seafood dealers and processors, or shoreside firms, have on local and regional economies in the Gulf. This data collection effort is the first systematic, multi-state effort to understand the economics of these shore-side firms. The effort has been conducted through onsite interviews for commercial seafood processors and as a mail survey for dealers and retailers. Up-to-date economic data being collected includes revenue, operating costs, annual expenditures, employment data, and characteristics of the fishing-related businesses. Furthermore, this data collection effort documents the current economic conditions of commercial seafood fishing related businesses. The information collected can also be used to estimate the regional economic contribution of the industry, number of jobs, and amount of revenue that commercial seafood fishing related-businesses add to the Gulf economy.

Marine Angler Recreational Fishery

Recreational fishing provides not only relaxation for stakeholders, but also economic contributions to the surrounding economy. In the Gulf, for example, residents participate in marine fisheries recreation, which contributes to the economy. A continued understanding of how marine angler expenditures influence local and regional economies in the Gulf through sales, income, and employment, provides key economic information, which can be used in fisheries management decisions. As part of a national initiative, the Commission and NOAA Fisheries have solicited salt-water anglers' expenditures on fishing trips throughout the Gulf in order to assess the size and economic contribution of the marine recreational fishing industry to the regional economy. Where possible, the survey used the MRIP intercept for trip expenditures and a mail follow-up survey for equipment and durable expenditures. The survey results provide estimates of marine recreational angler expenditures and the economic contribution of the marine angler recreational fishery to the Gulf.

Marine Recreational Use

Economic contributions from recreation to local and regional economies extend from other types of marine recreation besides consumptive ocean uses like recreational fishing. Such non-consumptive activities might include scenic landscape viewing, wildlife watching, kayaking, scuba diving, and boating. Determining and accounting for the economic contributions that these activities have on the economy is important when making marine resource and fishery management decisions, policies, and priorities. As a result of a national effort, the Commission, in partnership with NOAA Fisheries, has collected participation, effort, and expenditures related to ocean recreation activities, with the primary focus on non-consumptive uses. The effort sampled the general public using a survey panel where individuals were notified in advance so that they were able to keep track of their activities and expenditures. Similar to the marine angler economic survey, these survey results also provide estimates of expenditures and the economic contribution of marine recreational use to the Gulf in terms of jobs, income, and sales.

Valuation of Recreational Species

It is important that the fisheries management process consider the potential changes in economic value when promulgating new fishing regulations. For sportfishing policy changes, this requires estimates of anglers' valuation of regulations or anglers' valuation of the resulting harvest levels. There is considerable research on preferences for harvest levels and the values of anglers fishing from private boats or from the shore. Less research has been conducted to measure such values on for-hire fishing trips. To improve this, the Commission and NOAA Fisheries have partnered on a mail survey to generate new estimates of anglers' valuation of changes in regulations for key Federal and state managed recreational species on for-hire and private boat trips in the Gulf. The survey includes questions about recent recreational fishing activities, preferences for different types of fishing trips, and angler household characteristics. The fishing trip preference portion of the survey includes a stated preference choice experiment with questions that ask anglers to choose between hypothetical fishing trips. There are versions of the survey for choices between charter fishing trips and choices between private boat trips.

Future Economic Data Collection Activities

Given the experiences garnered through the recent aforementioned economic data collection activities, the Commission is well poised to move from one time data collection efforts to longitudinal economic data collection efforts. Proposed longitudinal economic data collection activities include the following: Economic Surveys of the Inshore Shrimp Harvesting Industry, Economic Surveys of the Blue Crab Harvesting Industry, Economic Surveys of the Oyster Harvesting Industry, Economic Surveys of the Finfish Harvesting Industry, Fishing Related Businesses Economic Surveys, Marine Recreational Angler Economic Surveys, and Marine Recreational Use Economic Surveys. Economic data collection will use online, mail, and in-person surveys that follow accepted survey methods.

In addition to aiding in the promulgation of fisheries management policies under the current MSA and its future reauthorization, results from the Commission's Economic Data Program can also assist other programs and efforts aimed at economic enhancement and management of the recreational and commercial fishing activities in the Gulf. For example, the Economic Data Program has recently contributed to the development of state level Fisheries Management Plans under the Commission's Interjurisdictional Fisheries Program. Given that the Economic Data Program can gauge the economic performance of key Gulf seafood and recreational fishing industries; this may in turn also allow for a more targeted approach for the newly developed marketing, sustainability, and traceability activities in the region. There may be opportunities where technological applications such as electronic seafood traceability efforts may also be able to collect key economic indicators that can be integrated with the aforementioned surveys and analysis. The Economic Data Program can also be used to assess the effect of the substantial restoration efforts expected around the Gulf as a result of RESTORE Act and National Resource Damage Assessment (NRDA) generated funds. It will be important to know if these activities are having a positive effect not only on ecosystem health but economic well-being of the commercial and recreational fishing industries as measured by economic data. These aforementioned activities will only be accomplished if additional funding is provided. Funding for the Economic Data Program is only guaranteed through June 2014.

SPORT FISH RESTORATION PROGRAM

The Federal Aid in Sport Fish Restoration Act was enacted in 1950, having been modeled after the Federal Aid in Wildlife Restoration Act, passed in 1937. The Sport Fish Restoration Program proved to be an extremely valuable source of funding for fisheries work important to the states. The Sport Fish Restoration Administrative Program (SFRAP) was established by the GSMFC in 1987, and its primary goal is to provide coordination of the recreational fisheries programs in the five Gulf States. Historically, there were three major categories of this program, including anadromous fish restoration, artificial reefs, and fisheries data, all of which supported interstate fisheries management.

Monitoring Artificial Reefs

One of the primary focuses of the SFRAP is artificial reefs. This component has established regional policies and planning documents, as well as discussed critical issues regarding reef deployment and monitoring. The recent hurricanes in the Gulf and the 2010 Deepwater Horizon oil spill disaster have underlined the fact that there is a need to establish baseline data on the vast artificial reef areas in the Gulf of Mexico. This data will allow states to determine how new artificial reefs are func-

tioning in comparison to established ones, how they compare to the function of natural reefs, and allow them to assess impacts to artificial reefs from future natural and man-made disasters. There is concern within the fisheries community about the removal of these structures and the impacts it may have on the resources that rely of them for food, protection, habitat, etc.

In an attempt to meet this need, the SFRAP is developing a Gulf-wide standardized artificial reef monitoring program. The goal of this new program would be to establish baseline data on artificial reefs across the Gulf of Mexico. The standardized monitoring protocols and gear types utilized in this program would match, as close as possible, to those used in ongoing long-term monitoring of natural reef areas in the Gulf of Mexico by NOAA Fisheries and SEAMAP. By doing so, this program would provide standardized data, on currently unmonitored habitats, for commercially and recreationally important species for use in more accurate stock assessments. It would also go a long way in alleviating the concerns of the fishing public about the lack of data from artificial reef habitats being used in the assessment of heavily managed species like red snapper. If a secure source of funding can be established to support this new component, it would allow the program to compile a sufficient set of baseline data that could be used in making scientifically based decisions about the management of artificial reefs and the fish populations they support.

Invasive Species Monitoring Efforts

One of the ongoing efforts under the SFRAP is a pilot study looking at the extent of the lionfish (*Pterois volitans* and *Pterois miles*) invasion in northern Gulf waters and conducting diver assessments of the native fish community for future evaluation of impact. Lionfish have proven to be extremely adaptable to their invaded range which now incorporates a large portion of the Eastern Atlantic, throughout the Caribbean and in recent years the Gulf of Mexico. They are the first marine finfish to become established, and the full impact they will have on the natural environment and native species is still widely unknown. However, recent studies suggest that these impacts could be severe.

The area covered by this pilot study is on the leading edge of the invasion, making it a great location to investigate the impacts of this invasive species. This pilot project is a cooperative effort between the Gulf States Marine Fisheries Commission, Mississippi Department of Marine Resources, Alabama Department of Natural Resources, the National Park Service and the U.S. Fish and Wildlife Service. The objectives of this new project are to:

1. Establish a lionfish monitoring program at established sites in the near coastal waters between Pensacola, FL and the Mississippi River Delta to monitor and track the invasion.
2. Perform diver surveys of density and richness of associated species at all sites to aid in future assessment of impacts as a result of the invasion.
3. Removal of lionfish encountered during normal monitoring operations.
4. Coordinate reporting activities with the established U.S. Fish and Wildlife Service hotline and the U.S. Geological Survey online reporting system.
5. Establishment of a "Strike Team" to harvest lionfish at locations beyond regular sampling sites.
6. Engage in outreach activities in the region to help inform the public about the seriousness of the lionfish invasion.

This pilot project will give us a clear picture of where we stand in regards to the invasive lionfish population in northern Gulf waters, and will provide much-needed information for future management decisions. It is the intention of the group to try and secure funding that would allow for annual surveys to be conducted which would provide much-needed data on the full impacts of lionfish on the native fish communities in northern Gulf waters.

Dr. FLEMING. Thank you, Mr. Donaldson. And thank you all for your testimony. At this point we will begin questions of our witnesses. To allow our members to participate, and to ensure we can hear from all of our witnesses today, Members are limited to 5 minutes for their questions. However, if Members have additional questions, we can have more than one round of questions. The Chairman now recognizes himself for questions.

Dr. Merrick, included in the NOAA budget request is an increase of approximately \$6 million for annual stock assessments and im-

proving data collection activities. And an increase of \$3 million for “survey and monitoring projects.” How will these increases be prioritized? Where is that money going to go?

Dr. MERRICK. The survey and monitoring funds, the \$3 million increase, those will be directly supporting surveys. So they are basically used to pay for charters. So in Alaska, for example, there are four or five pollock surveys that occur each summer. Those are all done through charters. So those increased funds that go to that line will basically be used to support the charter work.

Dr. FLEMING. OK. How much of this increased funding will go for new fisheries surveys, for fisheries which have not been surveyed, say, within the last 5 years?

Dr. MERRICK. Under the expanded annual stock assessment line, the one with the \$6 million increase, funds there will be used to support these new surveys. Part of this will go toward a territorial initiative that is basically directed toward specific islands, the Western Pacific, and also toward the Gulf and Caribbean to begin to survey stocks that are in areas that we have traditionally not been able to get to.

Those funds will also be able to support some of the advanced sampling technology work, particularly for the work with video cameras on bodies so that we can develop ways to survey reef fish. If you notice the number of stocks that are data poor, many of those are in those complexes, or reef fishes, simply because we can't get to a reef and do an actual good survey without disturbing it. So that is the general thrust of those funds.

Dr. FLEMING. I didn't quite catch everything you said. If I understand that \$6 million is going to go for new surveys. Is that part of what you said?

Dr. MERRICK. Parts of that will go for that.

Dr. FLEMING. Parts of it?

Dr. MERRICK. Yes.

Dr. FLEMING. Will that increase bring us up to date, so that all the major fisheries in the U.S. will have had a survey within the last 5 years?

Dr. MERRICK. Stocks. There are approximately 580 stocks. There are some stocks that will still remain unsurveyed, because the technologies may not exist at that point. We will have catch data, but we won't have what is called fisheries-independent data for some of those stocks. That is our goal, to get there. But to be realistic, I could not guarantee you that within the next 5 years we will be able to do surveys for all those.

Dr. FLEMING. OK. Can you tell us whether red snapper in the Southeast or the Gulf of Mexico will be surveyed in Fiscal Year 2014?

Dr. MERRICK. Yes.

Dr. FLEMING. OK—

Dr. MERRICK. For the Gulf of Mexico. In the South Atlantic stock, what we are developing there are alternative approaches to surveys there, but largely working with industry. There was cooperative research that is going to go on, both within the Carolinas and Georgia, as well as in Florida, to begin to develop measures of CPUE, biological characteristics of the stocks as well.

Dr. FLEMING. The electronic means that we have been discussing here today, do you see that replacing some of the techniques that we have used before, so that we can do better stock assessments, say, with less cost? Or do you think that is a supplement to what we have already been doing?

Dr. MERRICK. I think it would be both. For catch data, the electronic monitoring systems that are being developed will replace paper log books, for example, that will remove some of the work the fishermen have to do, and it will get the data back to us quicker. So we can turn around catch monitoring much faster.

Using electronic means such as video cameras will provide, in some situations, very good data to track discards that occur at sea, and probably much more rapidly in some ways than other techniques. It most likely will be cheaper than using observers. So our vision is that as that technology comes on, we will see less use of observers. And we would like to take funds that we are using there for observers to help support the development of electronic monitoring techniques.

Dr. FLEMING. Right. OK. Changing the subject a little bit, I am sure you have seen the video of red snapper, dead red snappers, floating in the water after decommissioning an oil and gas platform, I guess because of the explosives used. If this is an ongoing and perhaps increasing activity, how does NOAA account for this mortality?

Dr. MERRICK. It is used directly within the stock assessments.

Dr. FLEMING. Well, just the observation that it seems that when we decommission these rigs that we see a bunch of dead fish around, obviously that is a little counter-productive to what we are trying to do.

Dr. MERRICK. We agree completely.

Dr. FLEMING. I am sorry?

Dr. MERRICK. We agree completely. But unfortunately, it is not something we have regulatory control over. If they were blowing up an enlisted species, there there is an intersection with the ESA, so we could do something there. But with respect to Magnuson-Stevens, under Magnuson-Stevens, as it exists now, we do not have the regulatory authority to prohibit those activities.

What we can do is we include that as a separate form of mortality in the stock assessment. So the red snapper assessment that is about to go to the Gulf council will explicitly incorporate that mortality.

Dr. FLEMING. OK. Thank you. I yield to the Ranking Member for 5 minutes.

Mr. SABLAN. Thank you very much, Mr. Chairman. Dr. Merrick, I am going to start with you, because you mentioned the Pacific Islands and the Gulf States, of course, so that makes us very happy here, caught my attention.

But in your testimony you stated that getting the data necessary to manage fisheries is costly. This is especially true in the Western Pacific, particularly out in the islands, not only for the agency, but also for fishermen. So, can you please give us some example of how NOAA is working to get useful data at lower cost to the taxpayers and the regulated industry?

Dr. MERRICK. Well, if I may go outside the Pacific Islands, in the Gulf right now we are working with shrimp fishermen to transition the monitoring system—catch monitoring system and reporting system they have to an electronic system that uplinks the information by cell phone, so we get it much faster. And like with VMS, the vessel monitoring system, this is something different, in that it is giving us back information on catch. But we will work out a relationship with industry so that we will cover the cost of the unit, and then the fishermen would cover the cost of the data transmission. So that would lower the cost, as compared to an observer, and it will get us back the information much quicker. That is one example.

And the use of electronic monitoring, our commissions are helping us with that. I would expect to a certain degree we will see more of that within the Pacific Islands.

Mr. SABLAN. Thank you. Mr. Fisher, Chairman Hastings alluded to this earlier, sir—with electronic monitoring, there is something that seems to—like it is ready to be implemented in many fisheries around the country, but it is stalled for some reason. I am not going to say that it is lawyers, but the Chairman has a point there, that it stalled for some reason.

But can you give us your perspective on why electronic monitoring hasn't been adopted in the fisheries management commission, and what it would take for you to be able to utilize that technology?

Mr. FISHER. Thank you. Yes. On the West Coast we are involved in electronic monitoring. This year, for instance, we are going to have cameras on 7 fixed-gear boats, 2 whiting boats, and 14 trawl boats. The problem, basically, is on the West Coast the Council had passed a regulation that says that you have to have a human being as the observer. So that process will have to be changed. And I think it is similar in the North Pacific Council, also.

So, the regulatory process has to be able to be changed in order for us to actually have the cameras on the boats, instead of a human being. So that is the process that we are in, and that will probably take maybe 1 or 2 years.

Mr. SABLAN. All right. And so, Mr. Beal, you mentioned, sir, in your testimony, that electronic dealer reporting requires the entry of data such as species, day landed, gear type, and quantity. Wouldn't sending this information through the supply chain to make seafood traceable from boat to plate have economic benefits for fishermen and consumers?

Mr. BEAL. I am not sure I heard your question.

Mr. SABLAN. All right. Wouldn't sending information that you mentioned, the electronic dealer reporting requires the entry of data such as what kind of fish, when they were caught, and what kind of gear, was it net or line.

So, wouldn't sending this information, taking all this different information through the supply chain to make the seafood traceable from the catch to when it was served, to plate, have economic benefits for fishermen and consumers?

Mr. FISHER. Yes. The short answer is yes. The Atlantic Coastal Cooperative Statistics Program can work as the backbone of that data collection program. Most of those data elements are currently

being collected. And it can with the inclusion of a couple additional data elements that could provide that traceability from essentially harvest to plate, it will take some modifications to the program, but it can be done, yes.

Mr. SABLAN. All right. So, again, I am going to go back, Dr. Merrick. I have one more question, if I may.

Your agency's use of methods to assess data-poor stocks, are you confident that the methods you use represent sound science that adequately informs fishery management?

Dr. MERRICK. Yes. Most of those methods involve catch data. And the science that goes into using catch data as an estimator of stock abundance has become pretty robust. We have been through a series of external workshops looking at these methods. And they seem to have found that those methods are, in many cases, equivalent to the more data-intensive stock assessment models that we use for the more expensive, more important stocks, such as pollock.

Dr. FLEMING. The gentleman yields back. Let's see. Mr. Wittman is now recognized for 5 minutes.

Dr. WITTMAN. Thank you, Mr. Chairman. Gentlemen, thank you so much for joining us today. I want to go directly to Dr. Merrick and Mr. Beal. I wanted to ask you, in looking at how species are managed, if you see a benefit in managing recreational species like red snapper by harvest rates rather than by poundage quotas, and would the management structure for how striped bass is managed, would that be a good structure to look at, using another species, especially ones that have a variety of different user groups that target them?

And I will ask for Dr. Merrick and Mr. Beal to give me your perspectives on that.

Dr. MERRICK. I will deal with the first one. In the stock assessment process, ultimately it doesn't really matter. The currency of biomass or numbers of fish are equivalent. So if we determine that we were going to manage the recreational fishery based on numbers of fish, we have the equivalencies that can go back to biomass so we could do our stock assessments. So that is really just a management decision, ultimately.

The second question about whether we should deal with striped bass and red snapper in equivalent ways, I will turn that to Bob.

Dr. WITTMAN. OK. Mr. Beal?

Mr. BEAL. Thank you. You know, striped bass has been one of the great success stories along the Atlantic Coast. And the recreational fishery has had stable regulations: two fish at 28 inches for the coast, generally, since 1995. And the stock has continued to do well.

A number of other fisheries that are managed on quotas—summer flounder, black sea bass, a lot of the Mid-Atlantic species—those regulations have varied each year since the late 1990s. It is a complex system, and it is a difficult system for the fishermen to keep up with. So, I think there is some merit in exploring ways to dampen out the highs and lows and frequent changes in those other recreational fisheries.

The difficulty is in the way that Magnuson-Stevens is written now, the accountability measures and annual catch limits. The regulations have to be crafted so that recreational harvest limits are

not exceeded each year. So that is what creates the highs and lows. And also, the other part of that is, as I mentioned in my testimony, the MRIP program really isn't designed for high-resolution, State-specific harvest data for recreational species.

So, some of the management programs that we have along the Mid-Atlantic coast are asking a lot from the data that we do have.

Dr. WITTMAN. Right.

Dr. BEAL. So, looking at ways to dampen out those highs and lows, I think, is a good step forward.

Dr. WITTMAN. Thank you. I understand certainly your frustrations as I have the frustrations with the ACL as they kind of force a monolithic approach to species management versus other ways that I think would, as you said, dampen out the highs and lows and create some certainty for both the sport fishing community and the commercial fishing community.

Let me ask you this. You spoke specifically about data collection, which I think is critical, too, because obviously there is not enough data for all 538 of the stocks. So in absence of data, then we end up making management decisions that attract, obviously, a lot of lightning. I want to get your perspective, both Dr. Merrick and Mr. Beal, and any other panel members, too, about what can we do to advance the collection of data.

And we know that we are in a resource-challenged environment, so I think we have to look well beyond the current practices of how data is collected. I think there is a lot of other data out there that is collected with new technology. There is a massive amount of data that I think would be available from a variety of different sources. And I think an aggressive effort to collect that data and to assimilate it would create much, much better management regimes for the different bodies involved in management.

So, I would like to get your perspective on what you see as opportunities to gather more data from a variety of different sources.

Dr. MERRICK. One of the biggest areas from the fisheries-independent—the survey side that could gather more data is the use of acoustics. And we have started to use that extensively in Alaska. It is growing more in the Northeast. And that was one of the specific reasons why I hired Bill Carp there, because he comes from a strong acoustics background, and I wanted to see that occur more on the East Coast.

Dr. WITTMAN. Dr. Merrick, I have just got about 30 seconds left, so I want to interject there and ask this specifically.

Would you entertain that data coming from other sources besides government sources, i.e. academic institutions, i.e. fishermen, both commercial and sport fishermen?

Dr. MERRICK. Yes. We have an effort right now in Alaska to work with commercial fishermen to calibrate their sounders as a way of gathering acoustics data there. I would like to see more of that.

Dr. WITTMAN. OK. Very good. Any other panel members wish to comment? Mr. Beal?

Mr. BEAL. I will comment very briefly. Yes, I think we are going to hear in the next panel quite a bit about the NEAMAP program—

Dr. WITTMAN. Yes.

Mr. BEAL [continuing]. Along the Atlantic Coast. And that is a cooperative program, it is a commercial vessel, it is an academic institution. It is the Atlantic States Marine Fisheries Commission. It is funded by research set aside, which is a portion of the quota set aside to fund fisheries research.

And I think examples like that are things we need to explore. They don't cost the taxpayers, they cost, essentially, the users of the resource, the set-aside of that quota. And the cooperative nature through academics and commercial vessels, I think it is a great example of what we need to look at in the future.

Dr. WITTMAN. Very good. Thanks, Mr. Chairman. I yield back.

Dr. FLEMING. The gentleman yields back. The Chair recognizes Mr. Pallone for 5 minutes.

Mr. PALLONE. Thank you, Mr. Chairman. I am glad today's hearing is dedicated to data collection, because it underpins our ability to properly manage our Nation's fisheries. And, unfortunately, there is not much confidence in the data that is collected or the management of our fisheries.

The Magnuson-Stevens Act mandates strict compliance with catch limits and severe accountability measures that require fisheries closures and quota payback, but there is a disconnect between what Magnuson-Stevens requires fisheries managers to do, and what fisheries managers are able to do with the information they have at their disposal. And I am interested in how we remove this disconnect, and I am committed to ensuring reauthorization means a better Magnuson-Stevens Act.

I wanted to ask Mr. Merrick. I believe that we must give fisheries managers a level of discretion and flexibility in how to apply Magnuson-Stevens, so that when the disconnect between the rigid requirements and the available data is so great, that they can ensure a fair and reasonable outcome. So, Dr. Merrick, I would like you specifically to comment on what additional authority and investments are needed to eliminate the buffer or reduction in quota that fisheries managers put in place to account for inadequate science and data.

And I would also like to hear whether you believe the new MRIP program meets expectations in terms of being an improvement over the past, and whether you would support a new National Research Council report reviewing the status of recreational data collection. And I have to get to Bob also, so those three things: any additional authority or investments; comment on the MRIP; and the National Research Council, if you could.

Dr. MERRICK. MRIP. Recognize there are two real distinct parts to MRIP. One is the estimation technique, once you get the data, and the other is data collection.

The estimation technique was really the first part that was implemented. So when we started using the MRIP estimates in 2012, they represented basically the science that the National Academy study was proposing us to use. It is new statistical techniques. So now, any cod assessment, for example, in New England uses the new estimates. Anything that uses recreational data on the East Coast and the Gulf we use those new estimates. Those are good.

Where we hope to continue to expand the capabilities is the sampling part, and we are learning more there. Dr. Breidt will prob-

ably comment a little bit on that, but we have made significant progress. Things like iSnapper potentially could become a fundamentally important part of the MRIP protocol, and we just have to evaluate that.

Mr. PALLONE. What about the National Research Council report reviewing the status of recreational data collection? Would you support a new National Research Council report?

Dr. MERRICK. We would like to have either a National Academy study review, once it is full implemented within the next few years, or some other form of external peer review. Yes, we would support that.

Mr. PALLONE. And any suggestions about what additional authority or investments are needed to eliminate this buffer or reduction quota that the managers put in place to account for inadequate science or data? You have any suggestions or additional authority or investment that would be needed?

Dr. MERRICK. Sir, there is an alternative approach to that, in the sense that we can get really precise estimates of biomass and still see fluctuations in the ACL that are problematic to the industry. So one of the things—

Mr. PALLONE. So you don't see anything else that could be done at this point, other than what you are doing.

Dr. MERRICK. New England and the Northeast, we are doing a pretty good job. Most of those stock assessments are quite good. There are other areas, as we discussed earlier, there are data-poor stocks, where we can develop new methodologies to better survey those. And as that develops, we will see the precision of those estimates improve, and we will see the buffers go down.

Mr. PALLONE. All right. Let me ask Mr. Beal same thing. How do we get management and science and data collection in line? Do you see what type of challenges the Commission face, or what types of additional flexibility authority investments would help the Commission address these data collection challenges?

Mr. BEAL. I think the authority is there to address the data collection challenges right now. I think finding creative, efficient ways to collect the data through new technologies is important. I think the full implementation of MRIP is going to be a big help in that.

I think the Commission right now has been level-funded, and a lot of our survey efforts have been level-funded for a number of years. And we have had surveys drop off for horseshoe crabs in New Jersey, red drum, lobster, a number of other things. Just as costs have gotten higher and we have been level-funded for a number of years, those surveys have dropped off. So we have actually lost ground over the last 5 years on the data that we have to support fishery stock assessments.

So, I think the authority is there. I think we need to continue to explore research set-asides and other programs so we can find funding in creative ways to support the fishery science up and down the East Coast.

Mr. PALLONE. All right, thank you. Thank you, Mr. Chairman.

Dr. FLEMING. The gentleman yields back. The Chair recognizes Mr. Runyan for 5 minutes.

Mr. RUNYAN. Thank you, Chairman and gentlemen, thanks for your testimony. The first two questions—and I have a third one for Mr. Beal if I get to it, but the first two are for Dr. Merrick.

I think we can all agree cooperative research is extremely important, I expect, of collecting fisheries data. And I think many people will agree that New Jersey fishermen were among the hardest working with the scientists to lead the charge on tagging Atlantic sturgeon and gathering DNA data prior to the ESA listing over a year ago. My concern is that there is a budget request, a \$2 million increase, in Fiscal Year 2014 of cooperative research. But as we go back through and look at the Atlantic sturgeon, that data wasn't used in the determination of that ESA declaration.

Now, we want to be helpful, we want to make sure it is done. But does NMFS plan on using the DNA data when compiling biological opinions in the future? And is there a way that we can make sure that that data is—obviously valid, but being used?

Dr. MERRICK. Specifically speaking to the DNA data, that is crucial in the designation of distinct population segments. And why it was not used here is—I cannot answer that. But if you want to—we can answer that later. I can provide you something more concrete. But those data, particularly the tagging data, are now crucial to the ASMFC stock assessment. So at the time, the best available scientific information was not considered to include those, perhaps because it was all still preliminary. But the subsequent analyses done by the Center has led to the estimates of increased stock size that are supporting the ASMFC stock assessment.

Mr. RUNYAN. Well, I look forward to getting to the bottom of it. Because, obviously, at the end of the day, it is an investment of taxpayer money into data I don't think a lot of people would be—agree that is being used, which leads me to my next question.

In 2006, Congress had passed amendments to the Magnuson-Stevens Act which required creating a new recreational fisheries data collection program. And it has been 7 years and has not been fully implemented. And there is dissatisfaction among recreational fishermen. What is NOAA doing to implement the new program and get better buy-in from recreational fishermen?

Dr. MERRICK. MRIP estimation methods were implemented in 2012. So basically, any stock assessment that occurred from 2012 on includes MRIP estimates. The only thing that has not been implemented now are some of the new survey methodologies, and those are continuing to evolve because things like iSnapper continue to appear as ways that we could better sample the recreational industry.

Mr. RUNYAN. Are there any other issues that have arisen that set back the full implementation of the program?

Dr. MERRICK. We don't really feel it has been set back. It has been implemented.

Mr. RUNYAN. You just said, though, it wasn't fully implemented.

Dr. MERRICK. The estimation technique, which is the key part and was the statistical issue that provoked the National Academy review, and a lot of the initial concern, has been implemented.

Mr. RUNYAN. OK.

Dr. MERRICK. Survey techniques evolve, whether they are in a recreational fishery or commercial fishery. And that is what is happening within the recreational sampling now under MRIP.

Mr. RUNYAN. OK.

Dr. MERRICK. For example, the old estimates were based on phone surveys. Phone surveys don't work any more. So we have had to develop an angler registry and new approaches to sampling recreational fishermen. Six years ago, when this process started, the idea of iSnapper, no one would ever have thought of that. Apps didn't exist.

So we are adapting MRIP to evolving technologies, both for sampling and home surveys, and also for at sea.

Mr. RUNYAN. Do you—I mean just talking about the buy-in of the fishermen in general, do you realize how you are trying to, I guess, circumvent those problems of the distrust or the ever-changing way you are going to try to implement it to get what you need, is there any outreach there to make sure that they are part of the program?

Dr. MERRICK. We continue to reach out to industry, both the recreational and the commercial, through a variety of methods.

Mr. RUNYAN. Being?

Dr. MERRICK. OK. There is the MRIP 101, a program that the Northeast Center is working with the Gulf of Maine Research Institute, where they bring in fishermen and actually run them through the process, teaching them how you do fishery science. We have more people on the docks talking to industry.

As part of stock assessments, one of the processes we are trying to implement now is an initial meeting with fishermen to understand what they have seen in the stock over the period since the last assessment, so they can incorporate that into the stock assessment. We are attempting to make most of the data more available to industry for individuals to look at.

Mr. RUNYAN. OK—

Dr. MERRICK. And we actually welcome suggestions. If there are more ways that we can inform the industry, whether recreational or commercial, and keep them more up-to-date on data, on the assessment process, on what we are doing, we welcome that advice.

Mr. RUNYAN. Well, thank you for that. My time has expired. I yield back.

Dr. FLEMING. The gentleman yields back. The Chair recognizes the gentlelady from Guam.

Ms. BORDALLO. Thank you, Mr. Chairman. And good morning, gentlemen. Thank you for being here. The Magnuson-Stevens Act mandates that fisheries conservation and management measures must be based upon the best scientific data available. I think we all agree with that.

Unfortunately, Guam—and I will include the Northern Marianas in this—is the most data-poor region. According to NOAA, 70 percent of stocks in the Western Pacific have no stock assessments—70 percent. Yet, in the Mid-Atlantic region, all fishery stocks have been assessed.

Dr. Merrick, in the Central and Western Pacific, there is a very high occurrence of illegal, unreported, and unregulated fishing. This results in fewer fish for legal harvests, and produces inaccurate estimators used to calculate abundance and catch limits.

How does unknown IUU fishing mortality manifest itself into our stock assessments? And do you agree that IUU fishing, especially in the Pacific, could be a big problem for getting accurate data?

Dr. MERRICK. Agreed. We agree that it is a significant issue for—especially for highly migratory species. Tuna, for example.

Ms. BORDALLO. So you agree with that statement.

Dr. MERRICK. We agree.

Ms. BORDALLO. All right. Now—

Dr. MERRICK. And we are—our stock assessments attempt to adjust for that.

Ms. BORDALLO. Now, my next question, Dr. Merrick, is that given that the insular areas are so far behind the other regions in terms of stock assessments, what is the NMFS currently doing to assist our areas in improving data collection? And I know you referred to that in your opening statement about the Pacific area, to achieving the ability to conduct stock assessments and establish catch limits that reflect the true status of the stock.

How can we ensure that NMFS is allocating resources equally to all of its regions? How is it that we have all the assessments for one region, and that is the Mid-Atlantic, and 70 percent lacking in the Pacific area? How could this have happened?

Dr. MERRICK. If you follow the traditional ways of prioritizing, say, science efforts, government science efforts, it usually goes where the money is, to be honest. And since the Mid-Atlantic has a number of very valuable fish stocks, that is why they are well-assessed.

That is not a good way to meet our conservation mandates, and that is one of the reasons we have been working with Kitty Simons in the Western Pacific Council to start to understand what better science can we provide in the territories further out in the Western Pacific to start to meet those deficiencies. So we explicitly will be devoting funding just to that. Separate from anything else that the Pacific Islands Center would use these funds for, they will be directed further out into Guam and Samoa—

Ms. BORDALLO. Northern Marianas?

Dr. MERRICK. Yes.

Ms. BORDALLO. What I am hearing from you is that you have very valuable stocks in the Mid-Atlantic region, but the Pacific is not that valuable. Is that what you are saying?

Dr. MERRICK. In terms of the wealth to the Nation, in terms of economic wealth, correct. Except for highly migratory species. But that is—I mean that is part of the problem with Magnuson-Stevens. On the one hand it wants us to conserve species, and the other hand we need to worry about the economic benefit to the Nation. I would lean more toward the need, as a scientist, to make sure all stocks are adequately assessed.

Ms. BORDALLO. Now, you said \$6 million will be earmarked. Is that correct?

Dr. MERRICK. Excuse me?

Ms. BORDALLO. For this study. I heard you say that earlier.

Dr. MERRICK. That is—the \$6 million is an increase in the—

Ms. BORDALLO. For the entire region?

Dr. MERRICK. Yes, for the expanding of stock assessments—

Ms. BORDALLO. How much—well, how are you going to allocate this now? Are you going to be fair and give the Pacific area some of this?

Dr. MERRICK. Right now we have asked the Council and we have asked the Pacific Island Center how much—

Ms. BORDALLO. I don't know that the Ranking Member—I am sure he is going to agree with me on this—

Dr. MERRICK. I am sure he will.

Ms. BORDALLO [continuing]. Because we feel it is a very valuable area there, too. We have a lot of valuable fish stock.

Dr. MERRICK. OK. We have asked the Pacific Island Center and the Council how much they need, so we are waiting to hear back from them. My expectation is it will be something in the range, initially, of \$500,000 to start the process, in addition to the ship time what we normally give, and so on.

Ms. BORDALLO. Well, you think it will be a fair share now, as we go on?

Dr. MERRICK. I don't know how you define "fair," to be honest.

Ms. BORDALLO. Well, I hope, Dr. Merrick, you will watch out for our area. OK?

Dr. MERRICK. That is why I am proposing this.

Ms. BORDALLO. You are what?

Dr. MERRICK. That is why I have proposed this.

Ms. BORDALLO. Good. OK, all right. All right. Well, thank you very much—

Dr. MERRICK. It is also the same thing in the Caribbean, OK?

Ms. BORDALLO. Yes.

Dr. MERRICK. They have the same issues there.

Ms. BORDALLO. Absolutely. I am not questioning—

Dr. MERRICK. They have a similar initiative there.

Ms. BORDALLO. Well, we feel very strong about the territories.

Dr. MERRICK. So do we. Clearly, Kitty Simons feels very strongly about it.

Ms. BORDALLO. Thank you.

Dr. MERRICK. Every time I see her she talks about it.

Ms. BORDALLO. Thank you, Dr. Merrick. It is good to see you again. Thank you.

I yield back, Mr. Chairman.

Dr. FLEMING. The gentlelady yields back. The Chair recognizes Mr. Southerland for 5 minutes.

Mr. SOUTHERLAND. Thank you, Mr. Chairman. I would like to thank all the witnesses for being here today. Dr. Merrick, I wanted to turn some of my questions to you at first, and I wanted to talk about the stock assessments.

A few moments ago you made a statement that—for 2013 or into 2014, that there would be no stock assessment for the South Atlantic Snapper. You said you will use other techniques, or other—you will work with industry was your words that you stated.

For the record, this particular stock has been closed for 1,234 days with no stock assessment scheduled. And by your own admission, there won't be one. And I am trying to figure out why has it taken so long. By the time we—this stock was—the last stock assessment was 2008.

I also noted in your written testimony that priorities are established—when you determine stock assessments, priorities are established by evaluating the commercial importance of a stock. Obviously, the red snapper in the South Atlantic has significant commercial importance. And I am just—why has that taken so long? Why can't we get this done? You have done 62 assessments in 2012. Since the 2008 assessment, you could have conceivably done 240 stock assessments, and yet we have still not found the necessary time to do this for the red snapper.

Dr. MERRICK. Prioritization of stock assessments are done regionally.

Mr. SOUTHERLAND. I am sorry?

Dr. MERRICK. Prioritization of stock assessments is done regionally.

Mr. SOUTHERLAND. I can't hear you, sir, I am sorry. Is your mic on?

Dr. MERRICK. Yes.

Mr. SOUTHERLAND. OK.

Dr. MERRICK. Prioritization of stock assessments is performed regionally.

Mr. SOUTHERLAND. OK.

Dr. MERRICK. So that is a decision made between the appropriate council, the Center, the region, and then the Commission. There it is part of CDR. I would suggest that—

Mr. SOUTHERLAND. So you are suggesting, then, by that statement, that the Council doesn't have to listen to you in regards to a stock assessment that is so critical to the region.

Dr. MERRICK. That is correct. It is a decision made jointly between NMFS and the Council and the Commission.

Mr. SOUTHERLAND. Well, I will tell you the Gulf Council listens to everything you say.

Dr. MERRICK. OK.

Mr. SOUTHERLAND. And I have a representative at every Gulf Council meeting. And so, for you to say that they don't listen to you, and they don't have to listen to you, or they don't by choice, that is not occurring in the—I wish you could send an email and a memo to the Gulf Council, because they are not operating like that.

Dr. MERRICK. Well, I would hope they listen to us. But I hope they also have their own mind and make decisions that are regionally based.

Mr. SOUTHERLAND. Well, your regional director didn't get that memo, either. So I would—I just—it irritates me that—and I think for the average fisherman to understand that when a stock has been closed for 1,234 days, and you just admitted that there is not going to be any plans to have a stock assessment done, it undermines the credibility of the intention for the well being of both human and our fish.

Dr. MERRICK. To be correct, I did not say we had no intention of doing a stock assessment. This was—

Mr. SOUTHERLAND. No, by 2014.

Dr. MERRICK. Yes.

Mr. SOUTHERLAND. By 2014. So you did say by 2014. And the last one was done in 2008. So, therefore, we will have a fishery

that has been closed, by that time, my goodness, it could be approaching 2,000 days with no stock assessment.

But in your testimony you said stock assessments are prioritized by their commercial importance. And yet we all know that the red snapper in the South Atlantic and the Gulf of Mexico, in our region in Florida, for recreational fishermen there is hardly a fish that has greater commercial significance. I see an inconsistency there.

Dr. MERRICK. Well, I do not prioritize the stock assessments. Your folks at the Council, at the Commission, and then our folks from the regional office and the Center are the ones that do the prioritization.

Mr. SOUTHERLAND. Can I ask you—moving on also to—on May 9th, NOAA fisheries published a Federal registry, a final rule to implement Amendment 37 to the reef fishery management plan in the Gulf of Mexico regarding the trigger fish. The trigger fish—correct me if I am wrong, but the trigger fish is not really a primary fish, but more of a secondary by-catch. Is that—

Dr. MERRICK. I am sorry, I cannot answer that. I don't know about trigger fish. But perhaps the Gulf Commission could answer that better?

Mr. DONALDSON. It is more a secondary—yes.

Mr. SOUTHERLAND. OK. And let me say this, sir. You seem to—if you are familiar with this, it is a by-catch by recreational anglers going after what fish?

Mr. DONALDSON. Red snapper.

Mr. SOUTHERLAND. Red snapper. I am just curious, Dr. Merrick. Do you know—well, you don't know, you are not familiar with trigger fish. We will just keep it down here. Do you know the size hook that is used by an angler to catch snapper and grouper?

Mr. DONALDSON. Not really, no. I mean it is a normal-sized J-hook. I mean—

Mr. SOUTHERLAND. Well, it is a circle hook.

Mr. DONALDSON. Right.

Mr. SOUTHERLAND. OK? We mandate a circle hook.

Mr. DONALDSON. A circle hook, you are right.

Mr. SOUTHERLAND. OK? A 5/0, 6/0, 7/0, 8/0, 10/0, OK? Trigger fish have a much smaller mouth than snapper and grouper. Would anyone want to guess what the size hook is to catch a trigger fish?

Mr. DONALDSON. Smaller than a 5/0.

Mr. SOUTHERLAND. There you go. That is good. Smaller than a 5/0. A 1/0 and a 2/0. OK. So for NOAA to come out and say this fishery is over-fished, when all the fishermen that go out into the Gulf of Mexico catch them as by-catch using 5/0, 6/0, 7/0, 8/0, and 9/0, is really not true. There must be another reason. And I would state that today the greater reason is that the red snapper are so over-populated that they are hammering the trigger fish. And the trigger fish are, in fact, not over-fished, they are over-eaten. And with that, I yield back.

Dr. FLEMING. The gentleman yields back. The Chair recognizes Ms. Shea-Porter for 5 minutes.

Ms. SHEA-PORTER. Thank you, Mr. Chairman. In 2000, New Hampshire had 100 commercial groundfishing vessels. Last year there were 22. This year there are 14. Our industry is being absolutely decimated, as I know you are all aware. We have a 70 per-

cent reduction in catches now for cod, haddock, and flounder. And so many of the younger fishermen have just given up, and the older ones are wondering what is next for them. It is just being decimated. It is an economic industry and a way of life for the fishermen of the New England coastline, and I am very concerned about this, as I know we all are. We all care about what happens here.

But there do seem to be some problems. And so, Dr. Merrick, I would like to ask you if you could explain what progress NMFS has made in addressing the data gaps in cod assessments highlighted by the New England Fishery Management Council's Scientific and Statistical Committee and the Stock Assessment Review Committee.

Dr. MERRICK. Well, the first key one was the concern that the 2011 assessment was not adequate. The review committee said it was, but the SSC was concerned. And there was such concern that we did the assessment again in 2012, and we found the same results again.

But in between the two there were—there are several issues that we attempted to resolve that the SSC and the original review committee had pointed out. One of those was that they wanted to use—they wanted to have the improved recreational data, the MRIP data, used in the next assessment, which it was. They were concerned about discard mortality. At that point we were using 100 percent mortality from all discards, even though there was some limited scientific information that suggested otherwise. We met to discuss with industry a better approach to this. And so, when the 2012 cod assessment occurred, we used those revised estimates.

There was also concern about stock structure. We co-hosted a meeting with the Gulf Committee Research Institute from Portland to look at stock structure. We have not resolved that yet, so that is an ongoing area of research.

And then, finally, there is the issue of using CPUE, catch per unit effort, as observed by the fishermen, whether we could use that as another index within the stock assessment. It appears we can. It was not particularly useful in the 2012 stock assessment, we are going to continue to research that and work with industry to try to use that as a better indicator.

Ms. SHEA-PORTER. OK, thank you. Also, given the need to maintain human observers while electronic monitoring methods are improved, what steps can be taken to ensure the cost of these observers isn't an undue burden on the small fishermen?

Dr. MERRICK. Well, one of the simplest may be to develop a better strategy for using observers versus electronic monitoring. Because I think there are many situations that we are using an observer now because it is the only way we have to collect data. Implementing electronic monitoring with cameras and modifying the way the fishery is managed may be the best solution to dealing with that. That should bring the cost down. And then we can use observers in a more parsimonious manner. To collect those data we really have to have an observer, which is basically where we need biological information or more detail on the way fish are caught.

Ms. SHEA-PORTER. OK, thank you. And I would just like to say for the record, even though it has nothing to do with you, that this area has been considered a disaster in fishing there, and no fund-

ing has come, and I want to state for the record that the fishermen up and down the Eastern Seaboard and certainly in New England deserve to have these problems addressed.

They all want what we all want. We want to make sure that we replenish these fish stocks and that we have fishing there for the next generation and thereafter. And we recognize that there are challenges. But to just simply say that they can't fish without offering anything else and coming forward with assistance for them just seems wrong on every level. Thank you, and I yield back.

Dr. MERRICK. We agree completely with that. As a closure from our side, that—

Ms. SHEA-PORTER. I am sorry?

Dr. MERRICK. This may be the first of the commercial fishery disasters that is going to result from climate change. There may be more.

Ms. SHEA-PORTER. And actually, I would like to comment. We just talked about climate change. Because I have been talking to a lot of the fishermen there, and also some in seafood restaurants. And they have great concerns. They observe changes. And so I think we also need to be addressing that.

And I don't want anybody finger-pointing back and forth, whose fault that is. I just want to see us address that and address the economic disaster that our fishermen are experiencing as we take the science and do the right thing by the American people. Thank you, I yield back.

Dr. FLEMING. The gentlelady yields back. The Chair recognizes Mr. Lowenthal for 5 minutes. Oh, Mr. Lowenthal declines for this panel.

Therefore, our panel of witnesses, I do thank you for coming and giving your expert testimony today. Members of the Subcommittee may have additional questions for the witnesses, and we ask you to respond to these in writing. The hearing record will be open for 10 days to receive these responses.

We are now ready for our second panel. Thank you, panelists.

[Pause.]

Mr. SABLAN. Mr. Chairman, Chairman Fleming, I ask unanimous consent to allow Representative Keating to join us today and participate in today's hearing.

[No response.]

Dr. FLEMING. Hearing no objection, so ordered.

Mr. SABLAN. Thank you very much, Mr. Chairman.

Dr. FLEMING. OK. Among our panelists today we have Ms. Linda Behnken, Mr. Christopher Bonzek—let's see. Ms. Behnken is the Executive Director, Alaska Longline Fishermen's Association. Mr. Bonzek, Fishery Data Analyst, NorthEast Area Monitoring and Assessment Program, Department of Fisheries Science, Virginia Institute of Marine Science, College of William and Mary.

Dr. Breidt, Professor of Statistics and Associate Chair, Department of Statistics, Colorado State University, and member of the National Research Council's Committee on the Review of Recreational Fisheries Survey Methods.

Mr. Christopher Horton, Midwestern States Director, Congressional Sportsmen's Foundation and member of the Marine Fisheries Advisory Committee's Recreational Fisheries Working Group.

Dr. Kevin Stokesbury, Associate Professor and Chair, Department of Fisheries Oceanography, University of Massachusetts-Dartmouth School for Marine Science and Technology.

Captain Mike Colby, President, Double Hook Charters, Clearwater, Florida.

Panel, you may have seen the previous instructions. Basically, make sure that when you speak, that you push the button to turn it on and make sure the tip of the microphone is close by. You have 5 minutes to give your testimony. You will be under the green light the first 4 minutes, a yellow light the last minute. And then, if it turns red before you are done, please go ahead and wrap up as soon as possible, because your testimony will appear in full in the record.

Therefore—let's see. The Chair recognizes Mr. Keating for an introduction.

Mr. KEATING. Thank you, Mr. Chairman. And thank you, Ranking Member Sablan, for holding today's hearing. And I also want to thank Ranking Member Markey for his invitation to introduce one of today's witnesses. I have the honor of representing the port City of New Bedford in Massachusetts, home to the esteemed Kevin Stokesbury, who is an Associate Professor and Chair at the Department of Fisheries and Oceanography at the University of Massachusetts-Dartmouth School for Marine Science and Technology.

Dr. Stokesbury received his bachelor's of science in marine biology and master's of science in marine ecology at Acadia University in Nova Scotia in 1984 and in 1987. He then went on to complete his Ph.D. in marine ecology at the Universite Laval in Quebec City, Quebec, in 1994. From 1994 to 1996 he worked as a research assistant for the Center of Marine Science and Research at the University of North Carolina at Wilmington before moving on to the University of Alaska Fairbanks, as a research assistant until 1998.

It was then, nearly 15 years ago, in September 1998, that he first joined the School of Marine Science and Technology, SMST, at the University of Massachusetts-Dartmouth as an associate fellow, and where he quickly became an associate professor 2 years later. Since 2005, Dr. Stokesbury has served as the Chair of the Department of Fisheries and Oceanography.

Kevin's contributions to SMST, fisheries research, and the fishing community both within and outside of Southeastern Massachusetts is immeasurable. His innovative approaches to mapping scallop populations have revolutionized scallop management by using still photos and now high-resolution videos, as he has paved the way for groundbreaking cooperative research involving members of the fishing industry.

I think Kevin is a tremendous asset to the marine science community. I look forward to his testimony and I thank you for allowing me to introduce him.

Dr. FLEMING. The gentleman yields back. The Chair, therefore, recognizes Mr.—I am sorry. Yes, here we are. The Chair recognizes Ms. Behnken for 5 minutes.

**STATEMENT OF LINDA BEHNKEN, EXECUTIVE DIRECTOR,
ALASKA LONGLINE FISHERMEN'S ASSOCIATION**

Ms. BEHNKEN. Thank you, Mr. Chairman and members of the Committee. I work with a group of fishermen who understand the importance of good data to sustainable fisheries management, as well as the need to use a diverse set of monitoring tools to gather good data. We have partnered with NMFS on a number of research projects to advance data collection. Our most recent project was a joint cooperative project in electronic monitoring. That will be my focus today.

EM is in use or in development in Canada, Europe, Australia, and New Zealand. In the U.S. there have been 20 pilot programs to test EM. In my written comments I cited a number of the pilot programs and provided information on the very successful EM system that monitors halibut and groundfish off of the west coast of Canada.

To summarize, EM systems now generally achieve 98 percent reliability at catch monitoring, 94 to 96 percent of the fish can be identified to the species level, and EM achieves a 40 to 60 percent reduction in the cost over human observers for monitoring. Multiple studies have compared EM to human observers on providing catch composition data and found EM equally effective.

For example, a 2011 study concluded EM has been demonstrated to be an effective tool for at-sea monitoring, delivering fishing effort and catch data comparable to on-board observers. ALFA, the group that I run, our pilot program focused on refining EM deployment, operations, and cost in the hook-and-line halibut sable fish fishery off of Alaska.

NMFS's role in the pilot was to identify data collection objectives, performance standards, and the regulatory structure necessary to integrate EM with the restructured observer program that went into place in Alaska in 2013. I included a copy of ALFA's EM pilot program report to the fleet with my written comments, but I will just summarize here.

EM systems were deployed on 41 longline trips and monitored 215 longline hauls. EM systems captured a complete video record of 95.3 percent of the hauls. EM proved reliable and fully capable of providing the assessment of catch and catch composition that NMFS had identified as their pilot program objectives. And at \$200 to \$330 per sea day, EM monitoring costs were far less than the human observer program in Alaska, and a third of the human observer cost under the new, restructured program.

Despite this success, EM is not yet available to our fleet as an alternative to human observers. Concerns still linger about collecting biological data and length/weight data on released fish. I want to briefly address those concerns and put them to rest.

In Alaska's halibut sable fish fishery, biological data is collected during annual surveys through dockside sampling of catch and by observers on the larger boats. Relative to length/weight data on released fish, our Canadian neighbors use a measurement board outboard of the hauling station, which is a brightly painted board with contrasting stripes of color. Fish are held for three seconds in front of this board to allow the video to capture the length of the fish, and a reviewer to calculate the weight. This low-tech strategy

works, as does EM, for monitoring catch and by-catch. This system may be automated in the future, but reliable and statistically viable systems are available now, and currently in use.

In short, EM offers benefits for a number of U.S. fisheries. EM is urgently needed as an at-sea monitoring alternative by the small boat vessels that cannot afford the cost, safety concerns, logistical challenges, and intrusions imposed by observers.

Our fleet pays an assessment. Everybody in the fishery is paying for the program to monitor all these fisheries. It is an industry-funded program. What we are looking for is a program that works on our small boats. What we see is that EM collects necessary data without any of the issues, costs, or intrusions associated with a human observer.

In conclusion, the U.S. needs to move from pilot program to full implementation of EM as an alternative to human observers. In doing so, managers need to recognize that EM supplements stock assessment surveys, dockside sampling, and observations for larger boats. EM technology will continue to evolve. But, as I said, the perfect should not be the enemy of the good. Reliable systems are available now to assess catch, and should be used.

Specific to our fisheries in Alaska, what we need is a percentage of the fees that are collected from our fleet to be dedicated to EM deployment in our fleet. We need waivers from human observer coverage from boats that are carrying EM. And finally, we need NMFS to provide a vehicle to implement EM in 2014. Thank you, and I would be happy to answer questions.

[The prepared statement of Ms. Behnken follows:]

**Statement of Linda Behnken, Executive Director,
Alaska Longline Fishermen's Association**

Chairman Fleming and Members of the Subcommittee, thank you for this opportunity to testify on data collection in our Nation's fisheries.

I am a commercial fisherman and have been for 30 years. I served on the North Pacific Fishery Management Council from 1992-2001 and continue to actively participate in the Council process. I am the Executive Director of the Alaska Longline Fishermen's Association (ALFA), based in Sitka, Alaska, and am representing ALFA's over 100 members with this testimony.

ALFA members participate in the halibut/sablefish catch share fisheries, which are fixed gear or hook and line fisheries managed with Individual Fishing Quotas (IFQ). Our members are deckhands or owner/operators of vessels that range in size from open skiffs to 72 foot vessels, but the majority of the vessels are less than 60 feet in length. ALFA is a community-based organization with a strong commitment to sustainable fisheries and healthy fishing communities.

ALFA recognizes the importance of accurate data collection and the role it plays in science-based fisheries management. Over the years, our Association has engaged in multiple research projects, including a number of cooperative research projects with the National Marine Fisheries Service ("NMFS") in order to improve the data collection program so that we can better manage our Nation's fisheries. Of particular relevance to this hearing is ALFA's recently completed two-year electronic monitoring pilot program. This pilot program was funded by a National Fish and Wildlife Foundation Fisheries Innovation Fund grant. Our project partners were the NMFS Alaska Fisheries Science Center and other Alaska-based fishing organizations. Our goal was to assist in developing an electronic monitoring ("EM") system that could be used to improve fisheries data collection when Alaska's Restructured Observer program would be expanded to include small boats. We were specifically interested in improving deployment efficiencies and paving the way for a full scale cost effective EM program that met NMFS' data needs in the halibut/sablefish IFQ fisheries. More on that project later; but first some background on Alaska's observer program.

North Pacific Observer Program

The Alaska groundfish industry has operated with an industry-funded observer program for over 20 years. Until 2013, observer coverage requirements were based on vessel size, with vessels between 60 feet and 125 feet required to carry observers for 30 percent of their fishing time, and vessels over 125 feet operating with 100 percent coverage requirements. Halibut boats and boats less than 60 feet were exempt from coverage. Vessel owners were responsible for arranging observer coverage with observer contractors. Vessel owners also paid for that coverage through a “pay-as-you-go” system—vessels that carried an observer paid a daily fee to the observer contractor. Vessels that did not carry an observer, or were exempt from coverage, did not pay a fee. For years, NMFS has managed major groundfish fisheries based on the data collected from these observers and has opened and closed target fisheries when bycatch caps for halibut, salmon or crab were reached. NMFS and the International Pacific Halibut Commission (“IPHC”) have also successfully managed the non-observed groundfish and halibut fisheries relying on stock assessment surveys and dockside sampling for biological data and shore-side delivery systems for catch accounting.

Restructuring the North Pacific Observer Program

In 2010, the North Pacific Fishery Management Council (“Council”) initiated amendments to change the observer fee structure and the observer service delivery model for partial coverage vessels. The Council also identified an interest in additional at-sea monitoring of halibut vessels and groundfish vessels less than 60 feet. NMFS clarified that the agency’s “primary monitoring need” for the halibut/sablefish fleet was total catch composition and species discards, to complement the existing [International Pacific Halibut Commission] dockside monitoring program.”¹

In 2013, the restructured observer program was implemented. Under the new program, all fishermen operating in federally managed halibut and groundfish fisheries off Alaska pay a percentage-based observer fee on ex-vessel price² of the fish they deliver, whether the boat carries an observer that year or not. The program also authorizes NMFS to require observers on any size vessel and, for the first time, on halibut vessels. In these first years of the program, boats 40 feet and longer are being randomly selected for coverage.

Early in the restructuring process, ALFA and other organizations representing small, fixed-gear boats made clear to the Council and NMFS that our members support at-sea monitoring and are willing to pay a fair share of at-sea monitoring costs. We believe in improved data and support that objective. However, small boats represent 90 percent of the vessels directly regulated under the new observer program, and placing human observers on these vessels presents special problems.

Two options are available for gathering at-sea data: human observers or EM. EM uses cameras, video equipment, and sensors on fishing vessels to record catch and vessel position. For the small boat fleet, EM is a better option to gather needed data. EM is a better option because working space on Alaska’s small boat fleet is limited and living space is cramped at best. Fishermen, fisher women, and fishing families spend months living in a space that is roughly equivalent in size to a station wagon. Fishing time is weather-dependent, and boats can wait in town for weeks for fishable weather. Few boats have an extra bunk to offer an observer, and almost none can provide privacy. Observers must be fed and housed during and between fishing trips and vessel owners must purchase personal indemnity insurance and add safety equipment to accommodate observers. Observers need space for their sampling equipment and room to work both on deck and in cramped living quarters. In sum, human observers impose costs, safety issues, intrusions, and disruptions for small fishing boats and their crews.

In contrast, EM equipment collects necessary data without any of these issues. An EM unit sits idle while the boat waits for safe fishing weather, requiring neither a hotel nor food. EM units do not need bunk space to sleep. EM units do not get seasick, nor are they precluded from working on deck by safety concerns during particularly rough weather.³ Vessel owners do not have to buy additional safety equipment or purchase liability insurance for EM units. EM automatically turns on when a boat sets or hauls gear, providing an accurate and re-creatable record of catch.

¹ http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/Observer/311_OACreport.pdf.

² In theory, the observer fee is to be paid equally by fishermen and processors. In practice, NMFS and the Council acknowledge that the entire fee will likely be charged to fishermen.

³ <http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-213.pdf>. See page 54.

And EM is accurate. To quote a 2009 article that evaluated EM monitoring of yelloweye rockfish:

Since these data come from video footage collected at the moment of capture, the video estimate cannot be corrupted by misreporting of discards or by dumping fish after being retained. Thus, the video data provide an unbiased and virtually independent catch estimate—rare in fisheries monitoring—that captures the extent to which the official catch accounting systems might be biased.⁴

Alaska’s halibut/sablefish fleet uses hook and line gear to harvest fish. Fish are hauled aboard one at a time, which makes this fleet particularly well suited to EM. As each fish is brought aboard, it can be recorded on video. Likewise the gear, a single line with hooks attached, is deployed from one point on the boat and can easily be video monitored. In short, EM can be used to secure the catch and bycatch data NMFS identified as its objective for this fleet.

To ensure EM was ready for implementation concurrent with the 2013 launch of the restructured observer program, ALFA initiated the EM Pilot Program mentioned in the opening paragraphs of this testimony. Likewise, the Council signaled its intent that EM be used as an alternative to human observer coverage. The Council stated:

“The Council also approved a motion to task the Observer Advisory Committee, Council staff, and NMFS staff to develop electronic monitoring as an alternative tool for fulfilling observer coverage requirements with the intent that it be in place at the same time as the restructured observer program.”⁵

In the pilot program, ALFA’s responsibility was to refine EM deployment and operation, capturing costs and equipment effectiveness. NMFS’ role was to identify the performance standards and regulatory structure necessary to integrate EM with the restructured observer program. As the Council noted, the pilot program was “intended to provide operational experience and thus a basis for adding any necessary specificity to the regulations.”⁶ I have included a copy of ALFA’s EM Pilot Program Final Report with this testimony, but have summarized the results below.

EM lived up to the fleet’s expectation regarding performance, dependability and costs. ALFA contracted with Archipelago Marine Services (AMR), the Victoria-based company that has so successfully developed and deployed EM systems on Canadian halibut and groundfish vessels, to provide the necessary hardware and software for the pilot program. AMR’s expertise and knowledge of the fishing fleet were significant factors in the pilot program’s success. Over two years, EM systems were deployed on 41 fishing trips and monitored 215 longline hauls. The EM systems captured a complete video record of 95.3 percent of the hauls. Notably, 94 percent of captured fish were identified by species, with the remainder identified to a species grouping (e.g., rougheye/shortraker rockfish). It is also significant that at \$200–\$330 per day, EM monitoring costs were less than observer costs under Alaska’s previous “pay as you go” observer program and less than 1/3 of the observer costs under the 2013 restructured observer program. In short, EM proved reliable, cost effective, and fully capable of providing the assessment of catch and catch composition that NMFS identified as the primary monitoring objective for this fishery.

Bolstered by this success, EM was included as an alternative to human observers for the halibut/sablefish IFQ fishery in the proposed rule that was reviewed by the industry and recommended by the Council. To our dismay, NMFS subsequently dropped EM as an alternative to human observers, stating the observer amendment lacked the necessary specificity. In its place, NMFS is providing a voluntary EM pilot program that supplements, rather than acts as an alternative, to human observer coverage.

Where We Are Now

Although the cooperative research program conducted by ALFA and NMFS, the Canadian experience, and 20 other EM pilot programs demonstrate the success of EM, NMFS remains reluctant to use EM as an alternative to human observers. We understand that the technology will continue to evolve and improve but we feel strongly that we should not let the perfect be the enemy of the good. Alaska’s small boat fishermen believe NMFS’ fears are inconsistent with the proven history of EM in the U.S. and Canada, and that adequate technology is available now to integrate

⁴ <http://dx.doi.org/10.1577/C09-005.1>.

⁵ http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/Observer/ObserverMotion610.pdf.

⁶ http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/Observer/Council_EMLtr051412.pdf.

EM with Alaska's restructured observer program. I would like to take this opportunity to address some of the issues that have been raised and to relate some of the ways those issues have been resolved.

What EM Can Do

Biological data

NMFS and the IPHC currently secure "biological samples" from the sablefish and halibut stock assessment surveys and from the commercial fishery through at-sea and/or dockside samplers to meet stock assessment needs. Both sablefish and halibut fisheries have annual, resource-funded surveys (i.e., the fish are sold to off-set survey costs) that collect most of the information needed for stock assessments. The sablefish stock is managed with an age structured model that uses approximately 1,200 otoliths, or ear bones, collected from harvest in the commercial fishery each year. Currently, observers at-sea and in shore-based processing plants collect 3,000 to 5,000 sablefish otoliths each year, but only 1,100 to 1,200 are actually aged and used in the assessment.⁷ The IPHC uses dockside samplers to collect biological information from the commercial fishery for the halibut stock assessment.⁸ This collection program is funded and conducted independent of the observer program. Of the bycatch species taken in these fisheries, only rougheye rockfish has an age structured model and this model uses approximately 300 to 400 otoliths in total which are currently collected from the fixed gear and trawl fisheries. All other rockfish species taken as bycatch have stock assessments that do not rely on biological samples from the commercial fisheries. In other words, EM does not need to provide biological data for the halibut/sablefish fisheries. A working system is already in place.

When designing a monitoring program, it is essential that managers first conduct this kind of fishery specific assessment. Managers should ask: what data and biological samples do fishery managers need and how much of that data will be used? These questions should be separated from: what data and biological samples can be gathered? For example, if stock assessment scientists are not using an age structured model, how relevant is age data? If they are using an age-structured model and that model requires 1,000 samples—who benefits by observers collecting 3,000 samples?

Second, managers need to consider the full suite of management tools available to collect necessary data, including biological samples. To quote one of the Guiding Principles identified by a team of fisheries experts who met in April, 2011 to develop guidelines for fisheries monitoring programs: "Monitoring programs should consider a comprehensive suite of monitoring options and should be as thorough as possible at the outset of the program."⁹ Can the data be collected shore-side through dockside sampling? Can sufficient samples be collected from survey boats or larger commercial boats harvesting the same species? If some at-sea biological sampling is needed beyond what is currently gathered—how much? Collecting more data than NMFS has the resources to analyze or use accomplishes nothing at great cost to the industry. A careful evaluation of the data that is actually needed dictates the type of data collection program that is required. As to our fisheries, biological data is already being gathered. If there is, in fact, a need for more such data, it can be gathered when the vessels bring their catch to shore or by the larger vessels participating in the fishery.

Length and Weight Data

EM is currently used to gather length and weight data from commercial fisheries. In Canada's west coast halibut and groundfish fisheries, vessel owners have the option of attaching a brightly painted "measurement board" sporting horizontal stripes of contrasting colors to the side of their boat where the fish are brought aboard so the EM unit can record the length of any released fish. Remember that in these hook and line fisheries fish are brought aboard one at a time, with the "rollerman" carefully assisting each fish onto the boat. For catch that is retained, weight and length data are captured when the catch is brought to shore. To secure length data from fish that will not be retained, these Canadian fishermen are required to hold the fish over the measurement board for 3 seconds, which allows video reviewers to estimate length. Length is then converted to weight using species specific tables that have been developed over the years during stock assessments and catch monitoring. If the footage fails to adequately capture length, or a measurement board

⁷ <http://access.afsc.noaa.gov/al/searchform.cfm>.

⁸ <http://www.iphc.int/publications/rara/2010/2010.67.Commercialcatchsampling.pdf>.

⁹ <http://www.archipelago.ca/docs/GuidingPrinciplesForMonitoringPrograms.pdf>, p. 23.

is not used, an average length and weight is assumed and assigned.¹⁰ This low technology alternative is effective and time tested. It can be deployed immediately in Alaska's small boat fishery.

In time, EM systems can be expected to automate the length/weight conversion process and we are prepared to work with NMFS to test and improve automated systems. In the meantime, **we should be using reliable and cost effective monitoring technology** to gather the necessary data. That technology and equipment exist, are dependable, and are already in use.

Species Identification

Multiple pilot studies have compared the ability of human observers and EM to identify fish to the species level. While some species (small flounder and some rockfish) are more difficult to identify than others, when data produced by human observers and trained EM reviewers are compared, there is almost no difference in species identification accuracy. A 2010 IPHC study that compared human observers to EM reported:

Comparison of species identification of catch between standard observer estimation, complete hook-status observer coverage, and EM coverage showed statistically unbiased and acceptable comparability for almost all species except for some that could not be identified beyond the species grouping levels used in management. Similarly, comparisons of total species-specific numbers of fish estimated using EM collected and hook-status observer-collected data showed few statistically significant differences. Based on this study, although limited in scope, EM can provide an additional tool for catch monitoring in the commercial halibut fishery.¹¹

The 2011 Morro Bay pilot program concluded:

Consistent with the findings of the 2008 study, EM has been demonstrated to be an effective tool for at sea monitoring, delivering fishing effort and catch data comparable to on-board observers. There is no need for continuing to concentrate future research efforts on comparing EM data with observers.¹²

Likewise in the previously referenced 2011/12 ALFA pilot program, 94 percent of the fish captured were identified to the species level.¹³ EM can and is identifying fish to the species level and EM compares very favorably to human observers in doing so.

Cost Data

When NMFS analyzed options to restructure the North Pacific Observer Program, the agency estimated an observer day would cost \$467.¹⁴ When the 2013 Annual Deployment Plan was released last fall, the cost of an observer day had increased to \$980. (4,153 days purchased with \$4.4 million.)¹⁵ Although Federal startup funds are paying 2013 observer costs, fees are being collected from the industry this year and the industry will foot the entire bill from here forward.

In comparison, EM pilot programs in the U.S. and the EM program on the West Coast of Canada have daily costs that range from \$194 per day to \$580 per day, with the upper end cost in a Canadian trawl fishery.¹⁶ Costs in ALFA's EM halibut/sablefish pilot program were \$200 per day for Sitka-based boats and \$330 per day for Homer-based boats. In short, EM promises significant cost savings to the fishing industry, where observer programs are industry funded, and savings to NMFS where the Federal government is footing the bill.

Funding EM

Section 313 of the Magnuson-Stevens Act authorizes the North Pacific Council, in consultation with the Secretary of Commerce, to establish a fee system to fund Alaska's observer program. That fee may be used to ". . . station observers or electronic monitoring systems on board fishing vessels . . ." ¹⁷ At present, the full revenue stream from the industry is dedicated to deploying human observers on boats in Alaska and EM deployment is dependent on grant money or other opportunistic

¹⁰ <http://www.iphc.int/documents/commercial/bc/ifmp2011.pdf>, Appendix 2.

¹¹ <http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-213.pdf>, p. iii.

¹² http://www.pcouncil.org/wp-content/uploads/EM_AttB2b-Att1_FG_MorroBayPilot.pdf, p. 36.

¹³ <http://www.allafish.org/observer-program/electronic-monitoring.html>.

¹⁴ http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/Observer/Observer_restructuring910.pdf, p. A-23.

¹⁵ http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/Observer/2013DeploymentPlanFinal.pdf.

¹⁶ http://www.pcouncil.org/wp-content/uploads/EM_AttB2b-Att1_FG_MorroBayPilot.pdf, p. 31.

¹⁷ <http://www.nmfs.noaa.gov/sia/magact/>.

sources. That needs to change. Since the our fleet is better suited to EM than human observers, EM is cost effective, and observers fees paid by the industry may be dedicated to EM deployment, some or all of the observer tax revenue generated by the sablefish/halibut fleet should be dedicated to EM deployment in this fleet. Then EM will have a sustained, industry-funded revenue source.

Why Not EM?

EM provides a verifiable and permanent record of catch. EM can be used as part of an integrated monitoring program to meet identified management needs. EM is currently used with a high degree of accuracy to identify fish at the species level and to obtain length/weight measurements. EM is cost effective, less intrusive, and avoids safety issues associated with accommodating extra people on small boats. The fleet supports data gathering through EM. Yet, right now in Alaska, long-time small boat owners are selling their quota and Federal licenses, unwilling or unable to bear the extra burden of carrying an observer. By way of example, ALFA has a member I will call Dave who has been halibut fishing for 40 years. Dave, like many fishermen, is more comfortable with fish than with people he doesn't know. Even the potential of being selected for observer coverage this year has caused him to place his quota on the market. Dave told me: "I would rather face a gale than the strain of keeping someone I don't know safe and comfortable on my boat." The job loss and impacts to communities of this additional consolidation of the fleet will be long-term and irreversible unless EM is implemented as an alternative to human observers.

In the Final Rule that implemented the Alaska restructured observer program, multiple commenters posed the question to NMFS: Why not EM? In one response, NMFS stated that EM cannot be required because the Agency has not yet "developed performance standards and technical specifications" but that they are committed to further development of EM.¹⁸ After 20 U.S. pilot programs and watching our Canadian neighbors successfully implement an integrated EM program we can only ask—what can we do to make sure this proven technology is used in 2014? We thought we had done what was needed with our pilot program but are standing by to do whatever else is in our power to do to secure an EM alternative for our fleet by 2014.

Building Better Data Collection Systems

Data collection is critical to fisheries management. Monitoring fisheries catch is an important element of data collection. In designing monitoring systems, managers need to first identify goals and objectives. As a recently released document titled "Fisheries Monitoring Roadmap" states, "once monitoring objectives are clearly identified, only then can an appropriate combination of monitoring activities and tools be identified to successfully achieve these goals."¹⁹ (Emphasis added.) To ensure these tools are used in the most effective, efficient and least burdensome way, stakeholders should be actively engaged in designing the monitoring program. To quote another monitoring study: "From the outset of planning a monitoring program stakeholder engagement is crucial in effectively garnering support from diverse constituents to work toward common goals, avoid redundancies, and utilize knowledge within the fishery."²⁰ Once objectives are identified, stakeholders and managers can work together to identify the right suite of monitoring tools to secure the necessary data. We stand ready to work with NMFS to improve data collection and to add capabilities to the existing EM technology. But, as I stated earlier, we should use what we have that is proven. The perfect should not be the enemy of the good. Finally, we are willing to pay for EM deployment in our fleet and urge 30 percent of the observer program revenue collected from our fleet be dedicated to EM deployment on halibut/sablefish IFQ vessels.

What Can Congress Do To Improve Data Collection?

ALFA's recommendations for improved data collection on a National scale are:

- Direct NMFS to identify fishery specific monitoring objectives and to work with stakeholders to identify the right combination of cost effective monitoring tools to achieve objectives while "providing for the sustained participation of . . . communities."
- Direct NMFS to move beyond pilot programs to full integration of EM into fisheries monitoring programs, and to provide EM to small fixed gear boats now,

¹⁸ <http://alaskafisheries.noaa.gov/frules/77fr70062.pdf>, p. 70081.

¹⁹ http://www.nmfs.noaa.gov/sla/reg_svcs/Councils/ccc_2013/K_FisheriesMonitoringRoadmap.pdf, p. 3.

²⁰ <http://www.archipelago.ca/docs/GuidingPrinciplesForMonitoringPrograms.pdf>, p.5.

as an alternative to human observer coverage, where at-sea monitoring is required.

Specific to improving data collection in the Alaska halibut/sablefish IFQ fisheries, ALFA recommends the following:

- Integrate EM now, as an alternative to human observer coverage, in the halibut/sablefish IFQ fishery with the initial focus on assessing catch and estimating discards;
- Don't let the perfect be the enemy of the good: recognize that EM is part of an adaptive, integrated approach to at-sea monitoring that will accommodate additional or changing monitoring objectives and technological improvements;
- Work with industry and EM experts to deploy vessel appropriate and reliable technology, resolve logistical details, and achieve monitoring goals within cost targets;
- By 2014 and beyond, adequately and sustainably fund EM deployment by dedicating 30 percent of the observer fees collected from halibut and sablefish vessels to EM implementation in these fisheries;
- Release vessels carrying EM from human observer coverage in 2013 and beyond, or change policy as needed to allow an Exempted Fishing Permit to engage the halibut/sablefish fleet in a full-scale EM program by 2014.

Thank you for the opportunity to testify. I would be happy to provide any additional information that might help you in your work on this important issue.

Dr. FLEMING. Thank you, Ms. Behnken.
Next, Mr. Bonzek for 5 minutes.

STATEMENT OF CHRISTOPHER F. BONZEK, FISHERY DATA ANALYST, NORTHEAST AREA MONITORING AND ASSESSMENT PROGRAM (NEAMAP), DEPARTMENT OF FISHERIES SCIENCE, VIRGINIA INSTITUTE OF MARINE SCIENCE, COLLEGE OF WILLIAM AND MARY

Mr. BONZEK. Good morning. My name is Christopher Bonzek, and I serve as a member of the professional faculty at the Virginia Institute of Marine Science, which is a unit within the College of William and Mary in Virginia. Along with my research partners, Dr. Robert J. Latour and Mr. James Gartland, we serve as principal investigators for the Northeast Area Monitoring and Assessment Programs, Near Shore Fishery Independent Trawl Survey, or NEAMAP.

While the label NEAMAP is most often associated just with our cooperative research survey, the trawl survey that we conduct is actually just one element under the larger Atlantic States Marine Fisheries Commission's coordination umbrella. The term "cooperative fisheries research" represents a continuum of partnerships between fishermen and scientists which, at its best, becomes collaborative research, in which a full and constant exchange of ideas takes place, with all parties understanding the goals of and the importance of the collaboration.

We on the scientific side, along with our industry partners, Captain James Ruhle and his sons, have worked hard to make our survey a truly collaborative venture. When first conceived, our NEAMAP survey was not intended to necessarily be a cooperative research program. It is our great good fortune that it became one.

Our survey is designed to complement, both geographically and temporally, the surveys conducted by NOAA's Northeast Fisheries Science Center. We cover a broad latitudinal range between Cape Cod and Cape Hatteras within about 20 miles from the shore line, where NOAA cannot presently sample, due to the large size of their

research vessel. This relatively narrow band of water is heavily used by both fish and fishermen. Our current 6-year time series is just now reaching the point at which it will become most useful to assessment scientists and to fishery managers.

Our work is presently funded in what I believe to be a unique mechanism for large-scale, multi-purpose survey work. Under the current Magnuson-Stevens authorizations, fishery management councils can remove, or set aside, small portions of the quotas for certain species to fund research. Each year the Mid-Atlantic Council's research set-aside program grants us fish, rather than dollars: for 2013, a total of about 2.5 million pounds divided among 5 species. While our grant is administered by NOAA, no Federal dollars are expended. We raise research dollars by auctioning off our quota to fishermen, in partnership with the National Fisheries Institute, a private foundation.

This market-based funding is appealing on many levels. For example, it literally provides buy-in from stakeholders, which I believe is one reason why our survey is viewed by many as being a good model. This funding mechanism is limited, however, in how broadly it could be expanded.

Among other reasons why our survey is often thought of as a good model include both transparency and proprietorship. As to transparency, during so-called "demo days," to date we have provided about 300 stakeholders, the press, office holders, and citizens with the opportunity to view firsthand the actual process that we undertake at each sampling location. Let me personally invite each of you to spend a few hours with us one day in the near future.

As to proprietorship, I believe we are the only large-scale, multi-purpose survey which is conducted by an entity other than an agency which also sets regulations. That separation of research and management functions provides for additional credibility and may be a model to follow in the future.

A number of new technologies are becoming available which will have the potential to vastly increase the amounts and the quality of data provided by surveys such as ours. A few of these technologies are described in my written statement to the Subcommittee. Unfortunately, I don't have time to speak about them right here.

Permit me to offer several recommendations for how fishery-independent data collection might be improved through modifications to Magnuson-Stevens. These include, first, encourage the standardization of sampling gears among surveys; develop inter-survey and intra-survey calibrations; encourage the maximization of the amounts and types of data recorded by fishery-independent surveys; develop regional fish aging and fish diet centers; and last, and no doubt you will love it, provide adequate and stable funding for surveys. Details regarding these recommendations are included in my written submission.

In closing, I would emphasize that fish stock assessments and fishery management actions can be no better than the underlying data upon which they depend. Further, it is a fact that lack of data results in uncertainty, and under the current Magnuson-Stevens Act—as you, Mr. Chairman, noted earlier—uncertainty translates directly to lower quotas and lost dollars.

While each of my recommendation would mean expenditure of scarce dollars, the costs are small compared to the potential that exists in providing for healthy fish stocks and, most importantly, in healthy fishing communities.

I thank the Chair and the Subcommittee for the opportunity to play a role in the reauthorization process for Magnuson-Stevens, and I stand ready to help you in any way that I possibly can.

[The prepared statement of Mr. Bonzek follows:]

Statement of Christopher F. Bonzek, Fishery Data Analyst, Northeast Area Monitoring and Assessment Program (NEAMAP), Department of Fisheries Science, Virginia Institute of Marine Science, College of William and Mary

I thank the Committee for the invitation to relate our experiences with cooperative research and how such research has been and can be incorporated into the fishery stock assessment and management processes.

Credentials

I serve at the Virginia Institute of Marine Science (VIMS), which is the legally assigned marine research agency for the Commonwealth of Virginia as well as the degree-granting School of Marine Science at the College of William and Mary. Along with my research partners Dr. Robert J. Latour and Mr. James Gartland, we serve as Principal Investigators for the North East Area Monitoring and Assessment Program's (NEAMAP) Near Shore Fishery Independent Trawl Survey in the Mid-Atlantic and Southern New England waters. I have been directly involved in fishery independent monitoring surveys since 1981 and have been responsible for the design and supervision of such surveys since 2000.

NEAMAP Background

Though the term NEAMAP is most often associated only with the Mid-Atlantic and Southern New England near shore trawl survey that we conduct, our survey is actually just one component under the larger, fishery-independent-surveys umbrella known as NEAMAP. NEAMAP was originally developed by the Atlantic States Marine Fisheries Commission (ASMFC) as a body to coordinate existing and future fishery-independent data collection efforts in the northeast and mid-Atlantic. Development of our survey was the first major task of NEAMAP to fill an appreciable gap in fishery-independent survey coverage in the coastal ocean between Cape Cod and Cape Hatteras.

Now that our survey is fully operational, the NEAMAP oversight committees are beginning to expand their efforts to serve other coordination roles. These expanded roles include such activities as:

- Identifying other gaps in survey coverage and developing new or expanding current data collection efforts to fill data needs.
- Exploring standardization of data parameters collected among surveys.
- Exploring and evaluating new technologies (e.g. underwater cameras, current meters, bottom mapping equipment) that would either increase or streamline data collection efforts.
- Ensuring that data from fishery independent surveys are available to and included in the stock assessment process to the greatest extent possible.
- Holding a multi-surveys workshop at which survey personnel will describe and demonstrate their onboard data collection systems. The goal is to begin a process of data integration among surveys.
- Beginning to develop a web site at which multiple surveys will house their abundance indices at a one-stop address.

Cooperative Fisheries Research

The term "Cooperative Fisheries Research" represents a continuum of partnerships between fishermen and scientists which at the top end becomes "Collaborative Research" in which a full and constant exchange of ideas takes place in an atmosphere of mutual respect with all parties understanding the goals of and the importance of the collaboration.

When planned and executed properly, cooperative research efforts can yield results beyond answering the original scientific question. Being the perpetual and well-motivated students of natural processes that fishermen are, they will often make observations about phenomena which even an experienced scientist would never have considered. In a collaborative atmosphere, the scientists can take these

observations which might otherwise be dismissed as “anecdotal information” and form testable scientific hypotheses.

Most often, cooperative research efforts are relatively short term (1–3 years) projects designed to answer specific questions (e.g. to develop new fishing gear to reduce by-catch). In the Northeast, these projects are funded by the Cooperative Research Unit at the Northeast Fisheries Science Center. A number of excellent projects have been funded from that Unit.

Less common, at least on the East Coast, are long-term monitoring programs conducted as cooperative or collaborative ventures. To the best of my knowledge, out of approximately 20 trawl-based estuarine and marine fishery-independent surveys on this coast, only two such programs exist:

- The Maine/ New Hampshire Inshore Trawl Survey. This survey has operated since 2000 in the near coast waters of Maine and New Hampshire. Funding is annual and has rotated among the Northeast Consortium, NOAA Cooperative Research, and Congressional line item funding. The survey now operates under the NEAMAP umbrella described above.
- The NEAMAP Mid-Atlantic and Southern New England Near Shore Trawl Survey. This is the survey which my partners and I operate. A full description of the survey and its funding is provided below. In many of my comments that follow, I will refer to our survey using the “NEAMAP” moniker even though the entire NEAMAP program encompasses a broader set of surveys.

NEAMAP Mid-Atlantic and Southern New England Near Shore Trawl Survey

After successful completion of a pilot survey in the fall of 2006, funding was stitched together to begin full scale operations in the fall of 2007. Since then we have conducted two surveys per year, one in the spring and one in the fall, timed to complement but not to precisely match the Federal surveys. At the completion of our current spring 2013 survey, we will have completed six spring and six fall surveys. For many species, we are just now reaching the point at which our time series is long enough to reveal any underlying trends in abundance, or other biological characteristics, and to compare those trends with data from other sources.

As previously mentioned, our survey covers the near shore waters between Cape Cod and Cape Hatteras. In the mid-Atlantic region our survey covers a strip of water between the 20ft. and 60ft. contours, which corresponds to a region that extends from just beyond the shoreline to between 3 and 25 miles offshore. In Southern New England we sample waters between 60ft. and 120ft., or to about 20 miles offshore (Figure 1). Most of these regions cannot presently be sampled by the Federal surveys conducted by the Northeast Fisheries Science Center due to the depth restrictions of the large survey vessel used since 2009. While the total sampling area of our survey is small compared to the Federal survey, the zones that we sample are heavily used by both fish and fishermen and without data such as ours, assessments would suffer and managers would lack important data upon which to base their actions.

Both on the scientific side and our industry partners, Capt. James Ruhle, his sons, and his crew, we have worked hard to make our survey a truly collaborative venture. Nurturing such a relationship requires an ongoing effort. Our NEAMAP survey was not designed by ASMFC to necessarily be a cooperative research program. It is our good fortune that it became one.

Data from our survey are viewed as being valuable and unbiased not only by scientists but by most members of both the commercial and recreational communities as well. Several factors contribute to that perception:

- We underwent an extensive and very positive peer review process in 2008.
- Both scientists and industry members know and trust that we and Capt. Ruhle will uphold the strictest standards for how our fishing gear is deployed and how data are collected.
- We have strived to be as transparent as possible and have conducted numerous ‘den days’ during which we invite citizens, press, local, state, and Federal office holders, NGO’s, and others to spend part of a day on our survey vessel to observe every detail of our data collection efforts. To date, approximately 300 individuals have direct experience observing our operations.

It is worth special attention to note that the NEAMAP mid-Atlantic/Southern New England survey is unique in that it not only is a prime example of collaborative research but that it is housed at an academic institution. All other large scale multi-species fishery independent monitoring surveys of which I am aware are operated by state or Federal agencies (other academic or private entities do conduct monitoring surveys but they tend to be very localized in geographic coverage). Most often these same agencies hold regulatory authority over fish stocks. Due to its des-

ignation as the mandated marine research arm for the Commonwealth of Virginia, VIMS has a long history of conducting similar surveys in Chesapeake Bay and along the Virginia coast so we were able to build upon that historical knowledge base when constructing the NEAMAP survey. While certain disadvantages may exist, operating surveys from such an institution has several distinct advantages:

- Most importantly, academic institutions do not hold any regulatory authority thus there can be no question about whether there exists any conflict of interest between the management and research missions. This is not to say that any other agency or survey has or would purposely skew its survey results, but that removing the perception of a conflict of interest can be just as important as an actual conflict.
- Conducting a fishery independent monitoring survey necessarily involves repetitive sampling, month after month, year after year. This can sometimes lead to complacency among survey investigators and staff. While this can be true no matter where such a survey resides, at an academic institution there is more of a tendency to view such surveys not only in the context of repetitive sampling but also in the larger context of providing a platform upon which to continually expand the scope of work. This adds considerable value to the surveys and also provides for new and more interesting tasks for staff.
- Because they have to respond to the requirements of multiple funding organizations, frequently on short notice, academic research institutions are often far more nimble in routine management functions (e.g. hiring, purchasing, contracting) than traditional state or Federal agencies.

NEAMAP Funding

Our work is presently funded in what I believe to be a unique mechanism for large-scale survey work, namely through the Mid-Atlantic Fishery Management Council's (MAFMC) Research Set-Aside (RSA) program. This program was developed in previous Magnuson-Stevens authorization cycles. Under RSA, Councils can withhold (set aside) up to 3 percent of the total quota from certain species, to fund required research activities.

For each of the past five years, the MAFMC has granted us portions of the quotas for several species. For 2013 we own a total of about 2.5 million pounds of fish divided among five species.

Our annual grant is administered by NOAA, though no Federal dollars are expended. We raise research dollars by auctioning off our quota in partnership with the National Fisheries Institute (NFI). Both commercial and charter industry captains can benefit from this auction because the RSA quota that they purchase can be used during closed seasons, thus increasing their profit and allowing us to use some of those extra dollars for research.

This market-based funding is appealing on many levels. For example:

- As previously stated, no Federal dollars are expended (though considerable time is spent by Federal authorities in grant processing, permit processing, and enforcement).
- Industry literally has 'buy-in' in regards to the funded projects.
- The total amount of research dollars available is more dependent on market conditions than on the Federal budget.

For a number of reasons however, there are limitations on how widely this funding mechanism could be used to support more programs such as ours. These reasons include:

- The RSA quota must be harvested within the calendar year for which the project is granted. My Institute must 'front' approximately \$450,000 during the first half of each calendar year to pay for personnel, supplies, vessel charters, and so on before the first dollar is recovered from the auctioned fishes. Further, we are subject to varying market conditions. When we write our annual grant proposal we have to guess, about a year ahead of time, what the auction price will be for our RSA quota species, and then the fishermen have to guess at what their dockside sale price might be some months later when they harvest their RSA fishes. There is no guarantee that we will receive the anticipated research dollars. Many institutions could not support or would not allow such a situation.
- Because our program is so large and expensive, many other worthy and necessary projects are excluded from funding. Generally, after NEAMAP receives its quota assignments each year the remaining portions can support only one or two small projects. RSA was originally intended to fund smaller short term projects, not large long term monitoring.

- The RSA system depends upon there being more demand than supply for the fish species to be granted. In a future in which existed an overabundance of presently high value species such as summer flounder and black seabass, there would be little or no value in the RSA quotas.
- Similarly, if the portions of the quotas which could be used for RSA were to be increased, a situation could arise in which there was more RSA supply than demand. Only a subset of industry members can or will participate in raising RSA funds (e.g. through the NFI auction) so if there were more fish available than demand existed, the value of the quotas would decrease and the research could not be accomplished.
- Inequities can result from selling RSA quotas. Each pound of fish assigned to RSA is removed from the amounts available to the general industry and from recreational fishermen. Not all industry members can afford to participate in RSA fundraising or to wade through the required permitting process. People in the recreational sector may not feel the direct benefit of lowering their quota to support research.

The NEAMAP survey was not developed under the assumption that it would be funded by the MAFMC's RSA program. ASMFC intended that dedicated funding would be acquired but after it was recognized in 2006 that funding the NEAMAP survey was imperative, RSA was the only available mechanism. While the RSA system is currently working well for us, even in the depressed economy of recent years and even in a budgetary atmosphere in which many programs are seeing significant budget cuts, it is still a very unstable and unpredictable way to fund an ongoing, large scale, \$1 million per year program.

NEAMAP Survey Data and Data Uses

Our data have been examined for inclusion in all appropriate NEFSC and ASMFC assessments and assessment updates over the past two to three years. They have been incorporated as primary data sources for a smaller number of assessments. Where our data have not been included, it is universally due only to our still brief time series (six years). However, it is worth noting that our data have proved vital for both short-lived species such as Longfin squid and in NOAA's recent analyses of data on the extremely long-lived Atlantic sturgeon. Even for species for which our time series may still be too short, our biological data such as length-at-age have proven valuable. Further, our methodology for determining factors such as fish age for some species has forced a reexamination of the procedures used by other research groups. Our data have also been used by states to help set regulations such as size and creel limits.

While our catch processing and data processing methods necessarily differ from those used on surveys from NEFSC, the end-product data elements from the two surveys are virtually the same (except that there is almost no geographic overlap of the surveys). Each survey routinely produces assessment-related data such as:

- Overall and age-specific abundance indices, expressed either in numbers or biomass
- Length-frequencies, overall and by sex
- Geographic distribution (within the respective areas surveyed)
- Age-frequencies
- Sex ratios, overall or by size/age class
- Diets

It is worth noting that among large-scale surveys in the Northeast, the NEAMAP and NEFSC surveys (along with the ChesMMAAP survey that our research group also conducts within the confines of Chesapeake Bay), are the only ones that routinely record such extensive biological data elements. Due to logistical, manpower, and historical constraints, most surveys record only fish counts and length measurements (see Recommendations below).

New Technologies

As with every field of endeavor, technology is providing opportunities to collect more and better fishery-independent survey data and to provide it faster and more reliably. Affordable (given the importance attached to survey results) technologies exist to:

- Run scale model tank tests of fish trawls to determine the optimal shape while fishing. A fish trawl being used by a monitoring survey is a scientific sampling device and it should be viewed as being analogous to any piece of fine scale laboratory equipment. It must perform consistently.

- Allow researchers to constantly monitor the shape of their fish trawl to assure consistent performance within predetermined specifications as determined by the tank tests and to assure its proper deployment during each tow.
- Constantly monitor and record bottom type as the vessel conducts survey operations.
- Measure such parameters as temperature, salinity, depth, light intensity, pH, turbidity, and chlorophyll throughout the water column at locations where the trawls are deployed.
- Incorporate auto-sensing technologies using automatic recording of surface water quality parameters listed above using constant flow-through systems.
- Document fish behaviors in proximity to trawls using underwater cameras and other remote sensing technologies to move toward estimates of trawl capture efficiency.

A very exciting new technology which we plan to deploy later this year and in which we will collaborate with international partners from Norway, is a sophisticated camera and recording system which is installed near the aft end of a trawl and which documents the exact time when each specimen was captured. Fish can be identified to species and measured with surprising accuracy. A long list of research questions can be addressed with such technology, such as:

- Exactly when within a tow were specimens from each species captured?
- Within a tow, are some species typically captured together?
- For each species, are specimens typically captured in a group within a narrow time band or are they captured continuously throughout a tow?
- How long of a tow is long enough? A common criticism of monitoring surveys is that the tows are not long enough in duration to exhaust and capture larger specimens of some species. By fishing continuously over a very long duration and recording the exact time when each specimen is captured, this question can be addressed.
- Could adequate or even better data be obtained by fishing over long distances with an open-ended net, thus covering more ground but sacrificing fewer fish? This method would have to be supplemented with tows with a closed net to capture specimens for biological data (sex, maturity, age, diet, etc.).

Recommendations

Any number of improvements could be made to the extant fishery independent surveys (as well as the development of new surveys) to improve the scientific underpinnings of the current fish stock assessment and management systems. Among the most important are:

- Encourage the standardization of sampling gears among surveys

The so-called “400×12cm 3-bridle 4-seam” trawl developed by the former NEFSC Trawl Advisory Panel for use on the FSV Bigelow and used by NEAMAP as well has proved to be a remarkably stable and efficient scientific sampling device. The gear has also been put into use by the Canadian Department of Fisheries and Oceans. Scaled down versions either have been or will be deployed in the Great Lakes and in Chesapeake Bay.

Changes in sampling gear would necessarily disrupt the time series of ongoing trawl programs. However, every survey must periodically go through such perturbations, often caused by unforeseen events such as loss of survey vessels or inability to purchase materials to construct or repair nets. It is better to plan for such events than to have them thrust upon you.

A change in sampling gear for some surveys would also provide an opportunity to reexamine issues such as stratification, site selection, standardized data recording systems, and related issues.

- Develop inter-survey and intra-survey calibrations.

Every survey trawl operates according to its particular design and has unique catch efficiency characteristics for each species. For some fish stock assessment mathematical models, these differences are immaterial, as each survey ‘index’ is treated independently. However, other models require relative catch rate efficiencies among surveys to be well documented. A mechanism to calibrate catch rates among surveys is to complete multiple side-by-side tows. Such experiments can be quite expensive.

- Encourage the maximization of the amounts and types of data recorded by fishery independent surveys.

As mentioned above, due to logistical and historical limitations, many existing surveys record only a small portion of the biological data elements potentially available. Often, only counts and length measurements are logged. It is our experience that obtaining each specimen is expensive (i.e. paying for vessel time and fuel, paying survey personnel, purchasing nets, computers and other supplies) but that the marginal cost of taking more data points from each specimen is small. Some surveys are limited by vessel space and available personnel though it is our experience that if something is considered important enough it can usually be accomplished.

Additional data elements which should be routinely recorded for the maximum possible number of species include:

- Species total and individual specimen weights
- Sex, maturity, and reproductive stage on a subsample of specimens
- Preservation of ageing structures (e.g. otoliths, vertebrae) for the maximum possible number of species.
- Preservation of fish stomachs for development of diet indices. These data are required to advance toward multi-species and ecosystem management.

Obtaining these types of data from as many sources as possible not only will lead to better stock assessments but will lead to a better understanding of the marine environment as a whole, thus providing the underpinnings for multi-species and ecosystem models and management.

- Develop regional fish ageing and fish diet centers.

Many state and regional surveys, as well as being constrained in the types of data they feel able to collect, also do not have the resources to process large numbers of biological samples that may be preserved during field operations. A series of laboratories, not necessarily centered only at Federal facilities, where surveys could send such samples to be processed would not only significantly add to the types of data being collected but would assure a high level of standardization. Some organizations and institutions (my own being a good example) already have the infrastructure and knowledge bases to support such efforts so the step to becoming regional centers is one of scale rather than construction.

- Provide funding for surveys.

Fish stock assessments and fishery regulations can be no better than the underlying data upon which they depend. Fish stock assessment methods have become increasingly sophisticated and data intensive. Accurate, timely, and well-accepted assessments, as well as the subsequent setting of reasonable fishing regulations, depend upon accurate, timely, and well-accepted data. Fishery independent surveys are the primary unbiased source of data which inform us about the present status of most fish stocks.

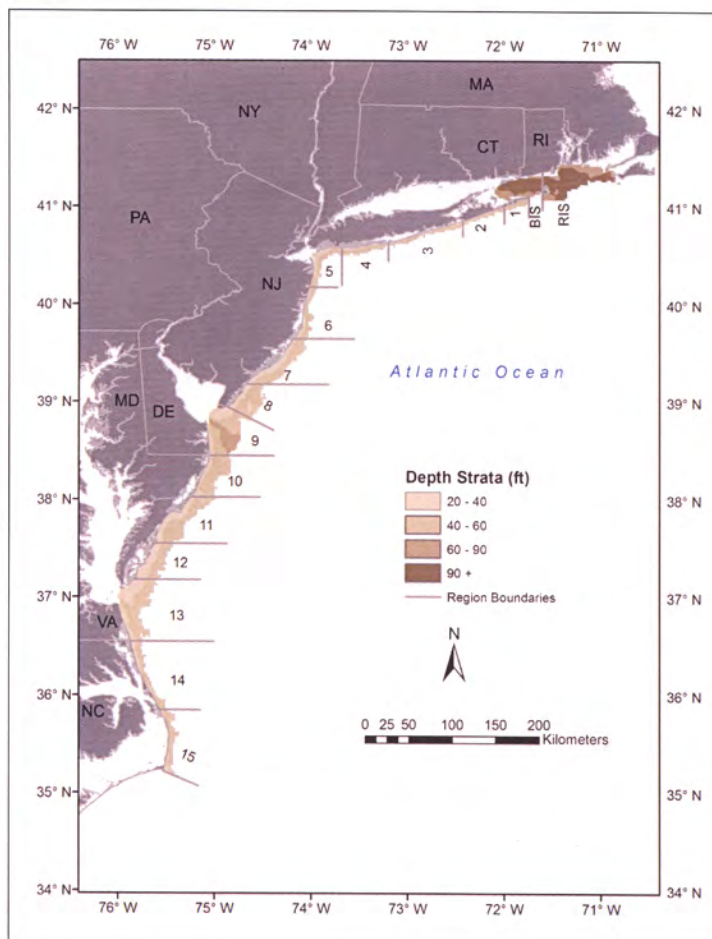
Under the current Magnuson law, lack of data literally means that fewer fish can be kept and that dollars will be lost to the fishing community. Due to the Magnuson provisions dealing with uncertainty, when the Fishery Management Councils and their respective Scientific and Statistical Committees set their quotas, they must take into account the level of uncertainty inherent in the associated assessments. The higher the level of uncertainty, the lower the quota can be. Lack of data means lower catch, lower income, and fewer jobs.

Several references within this testimony speak to current logistical limitations as to what data can be collected by some surveys as well as to unpredictable or unstable funding sources for surveys. These limitations and instabilities (as well as accomplishing the other recommendations listed above) can only be addressed through additional funding.

While recognizing that providing such new funding is difficult within the parameters of the current Federal budget, I simply state the need that efficient and effective fishery management requires it.

FIGURE 1. NEAMAP mid-Atlantic / Southern New England sampling area including region boundaries and depth strata.

Figure 1. NEAMAP mid-Atlantic / Southern New England sampling area including region boundaries and depth strata.



Dr. FLEMING. Thank you, Mr. Bonzek.
Next, Dr. Breidt, 5 minutes.

STATEMENT OF F. JAY BREIDT, PH.D., PROFESSOR OF STATISTICS AND ASSOCIATE CHAIR, DEPARTMENT OF STATISTICS, COLORADO STATE UNIVERSITY, AND MEMBER OF THE COMMITTEE ON THE REVIEW OF RECREATIONAL FISHERIES SURVEY METHODS

Dr. BREIDT. Thank you. Good afternoon, Mr. Chairman, and members of the Subcommittee. My name is Jay Breidt. I am a professor of statistics at Colorado State University.

In 2006 I was one of 10 members of the National Research Council, NRC, Committee on the Review of Recreational Fisheries Sur-

vey Methods, assembled in response to a request from the National Marine Fisheries Service, NMFS. NMFS sought recommendation from the NRC on potential improvements to its Marine Recreational Fisheries Statistics Survey, MRFSS. MRFSS computes marine recreational catch by multiplying the number of trips by the catch per trip. The number of trips is estimated using an offsite survey consisting of telephone interviews of anglers in coastal households. The catch per trip is estimated using onsite surveys in which anglers are intercepted while they are fishing or at their access points.

The NRC Committee concluded that the quality and timeliness of data from MRFSS were not adequate for effective management of recreational fisheries. The Committee focused primarily on MRFSS, but related surveys conducted by State agencies suffered from the same limitations.

Among the findings and recommendations of the NRC report were the following specific needs: greater program support for MRFSS; both financial resources and technical resources needed to handle surveys of such complexity; revision of the statistical estimation procedures, which were not matched to the complex sampling design used by MRFSS, leading to the potential for bias in the estimates; revision of the telephone sampling method, which relied on random digit dialing of households in coastal counties—a comprehensive universal sampling frame, possibly in the form of a national registry of salt water anglers was recommended to increase efficiency; greater quality control in the onsite survey, in which onsite samplers were given considerable latitude in where, when, and for how long to sample; greater coordination between Federal and State programs, and better communication and outreach, since the cooperation of recreational anglers is essential.

The findings and recommendations of the 2006 NRC report were arrived at by Committee consensus, and were subjected to NRC's review process. What follows are my observations, which do not represent Committee consensus or NRC review.

In my estimation, NMFS has directly addressed the needs described in the NRC report, and has developed a transparent, dynamic statistical system with a sound scientific basis. NMFS first addressed the need for greater technical support by building a team of academic and industry consultants, including mathematical statisticians, survey methodologists, and information technology specialists. This team, including myself, has collaborated with NMFS in developing a new marine recreational information program, MRIP. One of MRIP's first tasks was addressing the mismatch between design and estimation in the intercept survey, leading to a complete revision of statistical methods for the intercept data. These methods were extensively peer-reviewed before revised estimates for 2004 to 2011 were computed and released.

The National Salt Water Angler Registry, which began with Federal regulations in 2008, offers potential for greater efficiency in the telephone survey. Most coastal States, however, are exempted from the registry, because they license their anglers and provide contact information. Gaps in survey coverage result from State license exemptions and problems with the contact information. To fill the gaps, MRIP has been experimenting with dual frame sur-

veys, which combine angler license frames with household telephone or address frames. Designed experiments are underway to determine the most effective combination of telephone and mail data collection, in terms of getting good response rates and high-quality data in a timely manner.

The need for greater quality control in the intercept survey has been addressed through a 2010 pilot study in North Carolina in which new field protocols were compared side by side to traditional MRFSS intercept methods. The new design removed much of the sampler's discretion in where and when to sample. After peer review of the pilot study results, the new intercept survey protocols have been adopted, and are being implemented on the Atlantic and Gulf Coasts.

Coordination between State agencies and the Federal system has been a key feature of MRIP, which I have seen while taking part in the North Carolina pilot, and while assisting NMFSS in reviewing surveys for Oregon, Washington, California, and Hawaii. State agencies can obtain MRIP grant support to address recommendations arising in their reviews. The need for better communication and outreach has been addressed throughout MRIP. NMFSS staff responsible for outreach participate in technical meetings and produce press releases and educational videos explaining the revised methods to a general audience. Participation of the angling community is actively sought at all levels. For example, the technical redesign group for the large pelagic survey, on which I serve, includes two charter boat captains.

I do not think that all possible issues in collecting data necessary to manage recreational fishing are resolved, since the problems are continually evolving. But MRIP is structured to adapt effectively to such changes by developing, testing, and implementing appropriate tools. MRIP is exactly the sort of statistical program envisioned in the NRC report.

Thank you for inviting me to testify before the Subcommittee today. I am happy to answer any questions you may have.

[The prepared statement of Dr. Breidt follows:]

Statement of F. Jay Breidt, Ph.D., Department of Statistics, Colorado State University and Member, Committee on the Review of Recreational Fisheries Survey Methods, Ocean Studies Board, Division on Earth and Life Studies, National Research Council, The National Academies

Good morning, Mr. Chairman, Ranking Member Sablan, and members of the Subcommittee. My name is Jay Breidt. I am a professor of Statistics at Colorado State University, where I served as the Chair of the Department of Statistics from June 2005 until December 2010. I was also a member of the National Academies' National Research Council (NRC) Committee on the Review of Recreational Fisheries Survey Methods in 2006. The National Academy of Sciences was chartered by Congress in 1863 to advise the government on matters of science and technology.

The NRC study was conducted in response to a request from the National Marine Fisheries Service (NMFS) for a review of methods used to collect and analyze recreational marine fisheries data for application to fisheries management.

The NRC formed a committee of ten experts in fishery science and statistics. Dr. Patrick Sullivan, an associate professor in the Department of Natural Resources at Cornell University, served as the committee chair. After the study was released, Congress amended the Magnuson-Stevens Fishery Conservation and Management Act and included provisions to improve data collection regarding marine recreational fisheries. This written testimony reviews some major points from that report, titled *Review of Recreational Fisheries Survey Methods*, and describes progress made by NMFS on revising marine recreational data collection since 2006.

Historically, marine recreational catch in the United States has been documented through the Marine Recreational Fisheries Statistics Survey (MRFSS), which was established by NMFS in 1979. As compared to commercial fisheries, collecting data on recreational fisheries is more difficult due to the number of recreational saltwater anglers, the diverse range of places in which they fish, and the many different methods of recreational fishing.

Recreational catch is computed by multiplying the number of recreational trips by the catch per trip. MRFSS uses two complementary surveys to estimate the two terms in this product. The number of trips, or effort, is estimated using an offsite survey, consisting of telephone interviews of anglers in coastal households. The catch per trip is estimated using onsite surveys, in which anglers are "intercepted" while they are fishing or at their access points. Biological samples are also collected from these onsite intercepts.

It is now evident that for some fish stocks, the recreational fishery represents a significant component of the total catch. Since the establishment of MRFSS, marine fisheries management goals, objectives and context have changed. Management decisions are often made at finer spatial and temporal scales, the mix of recreational and commercial fishing has changed for many areas and species, and stock assessment models now make greater use of data from recreational fisheries. Accurate and timely data on catch and effort levels in recreational fisheries is imperative to ensure the sustainability of popularly targeted fish stocks.

NMFS's request for a study recognized the limitations of the MRFSS program and the agency sought recommendations from the NRC on potential improvements and alternative approaches.

STUDY CONCLUSIONS AND RECOMMENDATIONS

The NRC committee concluded that the MRFSS program was not adequate to meet the current demand for data, in terms of quality and timeliness, required for effective management of recreational fisheries. The committee's review focused primarily on MRFSS, but many related surveys conducted by state agencies suffered from the same limitations, and the committee's recommendations applied to those surveys as well. Greater coordination among Federal, state, and other survey programs was recommended to help gain a national perspective on the status of marine recreational fisheries.

Sampling Issues with the Telephone Survey

The committee identified several concerns with the telephone interview surveys. First, the increasing use of cellular telephones reduces the efficiency of the random-digit-dialing (RDD) telephone surveys conducted by MRFSS. The utility of RDD surveys targeted to coastal counties is reduced because cellular telephones are not geographically restricted (unlike land lines). Telephone surveys are also problematic because they depend on the accuracy of the angler's memory and their willingness to provide information to the caller.

The committee determined that a comprehensive, universal sampling frame with national coverage would be an efficient way to improve the data. The committee also suggested that this could be implemented in the form of a national registry of saltwater anglers or, alternatively, a license program that allows for no exemptions. Telephone surveys would then be based on this more limited sampling frame, rather than the RDD frame which includes all households, not just those with saltwater anglers. The report also recommended consideration of dual-frame surveys; for example, combining a sample from an incomplete list frame of anglers with an RDD sample of all households to ensure complete coverage.

Sampling Issues with the Intercept Survey

The committee identified various shortcomings in the intercept (onsite) survey methods. These methods do not account for anglers who have access to private fishing areas, and operate on the assumption that data from private areas would be similar to the data collected at public access sites. The committee further recommended that the onsite sampling frame, or list of access points, should be revised to account for low-activity access points.

MRFSS onsite samplers were given considerable latitude in the selection of sites and the measurement protocols followed at a selected site. The committee noted that the sampling process required greater quality control, with less latitude on the part of the samplers.

Other Sampling Issues

In addition to the suggestions on survey design, the report suggested further research to provide more reliable estimates of the number of fish caught in catch and release fisheries as well as a clearer understanding of mortality rates for fish caught and not brought to the dock.

The committee concluded that all for-hire recreational fishing operations should be required to maintain logbooks of fish landed and kept, as well as fish caught and released. They should be required to provide the information in a timely manner to the survey program in order to remain eligible for operation, and all information provided should be verifiable.

Improving Statistical Estimation

The study found that the sampling designs and data collection methods of recreational fishing surveys fell short of what was needed for management. Unverified assumptions may have interjected biases into some survey estimates. Understanding the extent of such biases would require testing the assumptions and determining the direction of bias.

The report noted that current estimators of catch rate were likely to be biased, given a mismatch between the design and estimation procedures for the onsite survey. Further, the estimators of uncertainty associated with various survey products were likely to be biased and too low. The committee concluded that these properties should be determined, enlisting the expertise of an independent and permanent research group of statisticians for ongoing evaluation and advice on the design and adequacy of the survey methods.

Incorporating Trends in Where, When, and Why People Fish

Good surveying requires tracking data on the human dimension of fishing, including the social and economic factors that might affect the number and location of fishing access sites. The MRFSS program was not designed to incorporate this information, but largely focused on biological factors.

The study recommended the implementation of a national trip and expenditure survey, which would support economic valuation studies, impact analyses, and other social and attitudinal studies. The study further recommended that the national data base on marine recreational fishing sites should be enhanced to support social and economic analysis. Examples of site characteristics that should be incorporated into the data base include: boat ramps, facilities, natural amenities, parking, size, and type.

Need for Better Communication and Outreach

Recreational anglers are the key source of information for the surveys and consequently their cooperation and support is essential to the success of the program. The committee concluded that if anglers understood the purpose of the surveys, the basic methodology, and the value of the data produced, they would be more likely to participate and provide reliable information.

The study recommended improving outreach by advising anglers and managers on the various uses of the data collected. Outreach and communication were identified in the report as areas that should be integral parts of the revised survey program. Last, angler associations should be engaged as partners with survey managers, and local knowledge, education, and community activities should be incorporated into the process.

Need for Greater Program Support

The NRC report concluded that a lack of resources had hindered the efforts of the MRFSS program staff to implement, operate, and improve the survey program. This included efforts to improve the program based on recommendations from earlier reviews. Financial resources available to the program were not sufficient to tackle the challenges associated with conducting an efficient and timely survey. Further, NMFS did not have sufficient technical expertise on its staff to handle surveys of such complexity.

In addition to a redesign of MRFSS, the study suggested that provisions be made for ongoing technical evaluation and modification as necessary. The study recognized that additional funding would be necessary to design, implement, and maintain a new program and that this might require a survey office devoted to the management and implementation of marine recreational surveys.

WHAT CHANGES HAVE OCCURRED SINCE 2006

The findings and recommendations of the 2006 NRC report were arrived at by committee consensus and were subjected to NRC's review process, including external peer review. I will now turn to my observations and opinions regarding changes to NMFS's recreational survey methods since the release of the NRC report. This reflects only my own experiences and does not represent either committee consensus or NRC review.

In my letter of invitation to this Subcommittee meeting, I was asked for my thoughts on whether the new program has been fully developed and implemented and whether the program is meeting the goals envisioned by Congress. It is my opinion that the revised program is now fully developed in the sense that it is a dynamic system for implementing necessary revisions, creating state-of-the-art design and estimation procedures, and adapting to evolving scientific challenges. The program is transparent, accessible, and subjected to rigorous peer review. This is exactly the sort of statistical program envisioned in the NRC report: there could not be a static, one-time fix to the problems with MRFSS. I now turn to the experiences on which my opinion is based.

In 2007, I was contacted by Dr. Dave van Voorhees of NMFS and asked to assist NMFS in their response to the NRC report, in developing a new Marine Recreational Information Program (MRIP). Since that time, I have acted as a consultant and have advised graduate students who have been supported on NMFS contracts. I have interacted with other consultants, including mathematical statisticians, survey methodologists and information technology specialists. This group includes academics and industry representatives. We have regularly collaborated with staff from NMFS and from state agencies.

Program Support

The NRC report recommended the establishment of a permanent and independent research group to evaluate recreational fisheries surveys and to guide future innovations. The NRC committee's goals in making this recommendation included building stakeholder confidence in the statistical system by involving a group from outside the Federal agency and by subjecting all work to rigorous peer review. The consultant model adopted by NMFS is entirely consistent with these goals, in my opinion. Consultants in collaboration with NMFS staff are establishing nationally consistent standards for design of marine recreational fisheries surveys, producing detailed sampling designs and data collection protocols, documenting all revised design and estimation procedures, and conducting outreach to stakeholders and to the scientific community.

Improving Statistical Estimation

One of the first problems addressed through MRIP was the mismatch between design and estimation in the intercept survey, potentially affecting the estimates of catch rate and their measures of uncertainty. The effect of the mismatch on the catch estimates was unknown, while the estimates of uncertainty were known to be biased and too low. I worked with other consultants and NMFS staff to revise the weighting procedure used for the intercept data, producing software and technical documentation that was then peer-reviewed by statisticians in industry, in academia, and in the Census Bureau. Revised estimates for 2004–2011 were then computed and released after extensive review. The improved estimation method directly addressed NRC concerns, and is transferable to future onsite surveys, to some auxiliary surveys conducted by NMFS (such as the Large Pelagics Survey), and to some surveys conducted by state agencies.

Sampling Issues with the Intercept Survey

The NRC critique of the intercept survey included in particular the fact that samplers were given too much latitude in the sampling process, including the opportunity to change to alternate sites or alternate modes of sampling. Samplers also focused on the highest-activity part of the day, under the untested assumption that this would be representative of catch rates at other times during the day. To address these concerns, NMFS undertook a pilot study in North Carolina during 2010, in which new field protocols were compared side-by-side to traditional MRFSS intercept survey methods. The new protocols included time-of-day stratification, to ensure some coverage at all times of the day and night. The new design eliminated much of the sampler's discretion in visiting sites, eliminating a source of variation that was of concern to the NRC committee. Unlike the traditional MRFSS, the sur-

vey design and estimation approach tested in North Carolina adhered closely to generally accepted statistical survey methods, while maintaining practical feasibility. Results of the pilot study were peer-reviewed and the final report was released earlier this spring. The new intercept survey protocols are now being implemented on the Atlantic and Gulf coasts.

Sampling Issues with the Telephone Survey

Implementation of the National Saltwater Angler Registry began with Federal regulations in 2008. States can be exempted from the registry if they license or register their anglers and provide sufficient contact information for those anglers for use in recreational surveys. Most coastal states qualify for this exemption. Gaps in survey coverage result from exemptions to state licensing requirements and problems with the contact information. MRIP, supported by statisticians and survey methodologists, has been experimenting with dual frame surveys of fishing effort to improve survey coverage. These methods combine angler license frames with household telephone or address frames. Surveys of effort are then conducted with a combination of telephone and mail data collection. Designed experiments are underway to determine the most effective contact options, in terms of getting good response rates and high quality data in a timely manner.

Other Sampling Issues

One MRIP project has tested the use of on-board video cameras to capture data on the species, size, and release condition of recreational discards. This study is ongoing.

MRIP has studied methods for collecting catch and effort data from the recreational for-hire sector, most recently focused on electronic logbook reporting coupled with dockside validation of the logbook data. These studies are ongoing.

Establishing Nationally Consistent Standards

A key feature of MRIP is cooperation between state agencies and the Federal system. I have personally observed this cooperation while taking part in the North Carolina Pilot Study, and while conducting reviews of the recreational fisheries survey methods for Oregon in 2010, Washington in 2010, California in 2011, and Hawaii in 2012. Each review included NMFS staff and a team of consultants, and each resulted in a series of recommendations to the state agency on methods to improve their recreational fisheries surveys. The agency, in turn, could apply to MRIP for grant support to address those recommendations. This helps transfer best practices being adopted at the Federal level to the states, with appropriate modifications for the unique state-level characteristics of the recreational fishery.

Communication and Outreach

NMFS has embraced the NRC recommendation of better communication and outreach. Many of the MRIP projects have the active participation of the recreational angling community, including fishing club representatives and recreational angling advocates. For example, I serve on a technical working group considering redesign of the Large Pelagics Survey. Two other members of that group are charter boat captains. NMFS staffers responsible for outreach participate in technical meetings and produce press releases and educational videos explaining the revised methods to a general audience. These materials are of high quality, in my opinion. For example, one of these videos, in which my colleague and I described the statistical re-estimation procedures, was awarded a 2013 Gold Screen/Blue Pencil Award of Excellence from the National Association of Government Communicators. Materials related to the revisions, together with data, software, and technical documentation, are now readily available on the MRIP website.

WHAT HAS YET TO BE DONE

One statistical issue in the NRC report that remains to be addressed is small area estimation, in which auxiliary data are used to produce estimates at finer spatial and temporal scales than would be possible using only the weighted survey data. This is an active area of statistical research, with applications throughout the Federal statistical system. It is natural that development of such estimators would come after resolving more fundamental design and estimation issues. According to the MRIP website, preliminary work on small area estimation has begun, including developing the necessary data base of auxiliary information, and constructing appropriate predictive models.

In my estimation, the MRIP program has directly addressed the concerns noted in the NRC report and is now a complete statistical system with a sound scientific basis. This was not true in 2006. I do not think that all issues are resolved, or ever will be, since the problems in collecting data necessary to manage recreational fishing are continually evolving. But the system in place now is structured to adapt effectively to such changes, by developing, testing, and implementing appropriate tools.

Thank you for inviting me to testify before the Subcommittee today. I am happy to answer any questions you may have.

Dr. FLEMING. Thank you, Dr. Breidt.
Mr. Horton, you are recognized for 5 minutes.

STATEMENT OF CHRISTOPHER HORTON, MIDWESTERN STATES DIRECTOR, CONGRESSIONAL SPORTSMEN'S FOUNDATION AND MEMBER OF MARINE FISHERIES ADVISORY COMMITTEE'S RECREATIONAL FISHERIES WORKING GROUP

Mr. HORTON. Good morning, Mr. Chairman and members of the Committee. My name is Chris Horton, and I am the Midwestern States Director for the Congressional Sportsmen's Foundation. In addition to working closely with State legislators in Texas and Louisiana on sportsmen-related issues including recreational salt water angling, I was recently appointed to the Recreational Fisheries Working Group of MAFAC.

An avid angler myself, I began my career as a fisheries management—for a State agency before eventually having the opportunity to help represent both fresh water and salt water recreational anglers in my current role at CSF. I want to thank you for the opportunity to speak to you today about recreational data collection relative to the reauthorization of Magnuson-Stevens.

Recreational salt water angling is an important component of our Nation's marine fisheries. In 2011, there were 11 million salt water anglers who contributed \$70 billion in sales impact, 22 billion of which was on fishing-related equipment.

Now, when anglers buy rods, reels, lures, line, and other fishing-related equipment, in addition to the fuel for their boats, an angler-supported excise tax is paid into the Aquatic Resources and Boating Trust Fund, which is appropriated back to the States to reinvest in fisheries resources. These angler-generated funds, along with the fishing licenses they purchase, are part of the American system of conservation funding. No other single group of marine users invest more in our marine fisheries resources. Recreational salt water angling is not only good for our economy, it is good for our fisheries, as well.

Recreational fishing is not always about how many fish we can harvest. Recreational fishing is an opportunity to relax with family and friends, presents an enjoyable and rewarding challenge, and provides an opportunity to reconnect people of all ages with a genuine appreciation for our great outdoors. The methods, locations, and means of accessing our fisheries are as diverse as the fish that we pursue.

Though MRIP has begun addressing many of the data collection problems outlined in the National Research Council report of 2006, further improvements to provide timely reporting require a significant increase in funding. And although we could spend more and

might edge closer to the accuracy of the commercial data, the quality of the data will never be equal. It is simply impossible to make contact with every recreational angler, and count every fish they catch.

However, the ability to count every fish isn't the problem. The problem lies with how the data is used for management. Although NOAA tries to treat them the same, commercial and recreational fisheries are fundamentally different, and they should be managed differently. Here is why.

Commercial fisheries are pursued by relatively few fishers, with the same goal: harvest as many fish as allowed as efficiently as possible in order to maximize profit. Commercial landings can usually be counted and quotas enforced in real time. Thus, managing commercial fisheries based on biomass makes sense. However, managing the recreational component based on biomass doesn't.

Recreational fisheries are very dynamic, and are enjoyed by 11 million Americans. How often and why we go fishing is difficult, if not impossible to predict. So catch must be estimated, not counted, resulting in a significant lag time for producing such estimates. At best, 2½ months pass before the estimates are even available. Because of this delay, the real-time quota management necessary to be successful under the current NOAA management strategy is just not practical for recreational fisheries, or all recreational fisheries.

As a former State fisheries manager, I can tell you that poundage-based management is not even considered by inland fish and wildlife agencies. The red snapper fishery in the Gulf of Mexico is a prime example of where this biomass-based system of management is having an unnecessary and devastating impact on recreational angling.

In summary, MRIP is certainly an improvement in terms of survey methodology. However, a couple of serious and unavoidable problems remain: the time necessary to produce harvest estimates and a conversion of those estimates to pounds. Unfortunately, the current management method preferred by NOAA hinges on these two deficiencies to be successful. And it is not.

We need to look at other proven strategies that can effectively use the current data, rather than continue to insist a commercial fisheries management strategy will work for every recreational fishery. For decades now, inland fishery stocks have been successfully managed based on population information and harvest rates, not on biomass. These same successful tools can be applied, in part, to marine recreational fisheries management. And, like on the inland waters, we can still protect the stock while maximizing benefits for recreational anglers and the economy. We can and must do better for recreational anglers.

Last, I plan to submit an addendum to my written testimony to the Subcommittee that clarifies the importance of concurrently addressing not only how MRIP data should be used for the recreational sector, but also an examination of how the proposed strategy relates to and potentially affects the current recreational and commercial allocation quotes for some fisheries.

Thank you for the time, Mr. Chairman.

[The prepared statement of Mr. Horton follows:]

**Statement of Chris Horton, Midwestern States Director,
Congressional Sportsmen Foundation**

Good morning Mr. Chairman, Congressman Sablan and members of the Committee. My name is Chris Horton, and I'm the Midwestern States Director for the Congressional Sportsmen's Foundation (CSF). Established in 1989, CSF works with Congress, Governors, and state legislatures to protect and advance hunting, recreational angling and shooting and trapping.

In addition to working closely with state legislators in Texas and Louisiana on various sportsmen's related issues, including recreational saltwater angling, I was recently appointed to the Recreational Fisheries Working Group of the Marine Fisheries Advisory Committee. An avid angler myself, I began my career as a fisheries management biologist for a state natural resource agency where I was tasked with managing the most popular and sought after group of game fish in the state—bass. I later became the conservation director for the largest fishing organization in the world (B.A.S.S.) before having the opportunity to help represent both freshwater and saltwater anglers in my current role with the Congressional Sportsmen's Foundation.

I sincerely thank the members of this Subcommittee for the opportunity to speak with you today about recreational data collection as you begin discussions on the reauthorization of the Magnuson-Stevens Fishery Management Act. Recreational saltwater anglers are an important and significant component of our nation's marine fisheries. According to the 2011 NOAA survey, there were more than 11 million saltwater anglers who took 70 million fishing related trips and who contributed \$70 billion in sales impacts to our economy—resulting in 455,000 jobs (both full and part time) in that year alone.

Another significant, yet often overlooked statistic is that recreational anglers spent \$22 billion in 2011 on durable fishing-related equipment. When anglers purchase rods, reels, lures, hooks, line, sinkers, trolling motors, marine electronics and other equipment, an angler-supported excise tax is paid into the Aquatic Resources and Boating Trust Fund, which is appropriated back to the states to reinvest in the fisheries resource. These funds, along with angler license purchases, are part of the American System of Conservation Funding, and the most successful conservation model in the world. No other single group of marine users gives back directly or as substantially for the management and enhancement of our fisheries resources. Recreational saltwater angling is not only good for our economy—it's good for our fisheries.

Recreational fishing isn't about how many fish you can harvest. Granted, the ability to bring home a few fish for the family is certainly a bonus for recreational anglers. However, the ability to go fishing for the average American offers so much more in return than simply the filets. It's an opportunity to relax with family and friends, presents an enjoyable and rewarding challenge of figuring out how to catch specific species and provides an opportunity to reconnect people, both young and old, with our outdoor heritage and the appreciation we have for our natural resources. The methods they employ to go fishing, the locations they fish and the species they try to catch are as diverse as this nation itself. The private boat angler in the Southeast has hundreds of inlets and passes to choose from to get to the ocean, while the Pacific Northwest angler is limited to a few dozen. Fishing by wading into shallow waters or casting from a beach, dock or pier is popular in some areas, while shoreline access may be limited for others.

Unlike a commercial fisherman who has a personal financial stake in a fishery, and thus its successful management, a recreational angler just wants to go fishing. It is this individual that is the basis for the recreational data collection system. This is the critical difference that must be kept in mind when contemplating recreational data collection—recreational anglers number in the millions and are pursuing a hobby.

In their review of the national marine fishery data collection system, the National Research Council (NRC) found significant problems with the catch estimation methodologies and suggested remedies. As other speakers note, NOAA has begun addressing those problems and the system in place today, the Marine Recreational Information Program (MRIP), is better than the old catch estimation system known as the Marine Recreational Fisheries Statistics Survey (MRFSS). But, the NRC also acknowledged the recreational catch will, in the vast majority of cases, be estimated using survey methodology. The current system, though an improvement from the last, would require a significant increase in funding to make it substantially better. And, although we could potentially get closer to the accuracy of the commercial fisheries data with additional investments, the quality of the data will never be equal.

It is simply impossible to contact every recreational angler and count every fish they catch.

Fortunately, it's not necessary that we continue to sink more money into a program that will never be 100 percent accurate. Instead, it would make more sense and be less costly to offer a different management approach for recreational fisheries. The real problem, as we see it, is not with the recreational data collection system. The problem lies with how the data is used for management.

It must be recognized that commercial and recreational fisheries are fundamentally different activities, with dissimilar harvest data collection systems and thus require different management approaches. Yet, the last reauthorization of the Magnuson-Stevens Act, for all intents and purposes, uses the same management strategy for both recreational and commercial fisheries—primarily poundage-based hard quotas with accountability measures. Although the accuracy of the commercial fisheries harvest data is suited well for this approach, the accuracy and timeliness of recreational harvest data is not and likely never will be. Again, it is not possible to contact every recreational angler and count every fish they catch. Instead, we should develop a separate management strategy for recreational fisheries based on the data available.

Commercial fisheries are managed for yield. They are pursued by relatively few fishers, all with (understandably) the same goal—to harvest as many fish as possible as efficiently as possible in order to maximize profit from the sale of whatever species they pursue. Commercial landings can usually be counted or weighed in real time, thus quotas can be enforced in real time. This allows managers to close a fishery before the allowable catch is exceeded. In short, a commercial fishery's catch can be managed in real time and based on verified landings. Managing commercial fisheries based on biomass or yield makes sense.

Managing the recreational component of marine fisheries with similar yield-based parameters, on the other hand, does not. Recreational fisheries are dynamic in nature and enjoyed by millions of individuals with diverse goals. Again, some try to catch fish for food while others simply want to have fun catching and releasing fish and enjoying their time outdoors, either in solitude or in the company of friends and family. The frequency of their trips often depends on circumstances such as stock abundance, weather, the economy or any of a myriad of factors. Catch is estimated, not counted, with a significant time lag for producing such estimates. Landings estimates, at best, are compiled 45 days after the end of each two-month sampling wave; thus 2 months pass before any estimate of what anglers are catching in a particular fishery can be developed. Unlike commercial fisheries management, real-time catch information for the recreational users is simply not practical (with very rare exception). For this reason, recreational fisheries cannot be fairly managed under the current management system.

The Gulf of Mexico red snapper fishery is a prime example of where managing a recreational fishery based on total yield, rather than in relation to the health of the fishery, is having a devastating and unnecessary impact on recreational anglers and coastal economies. Even though methodologies to estimate recreational harvest have improved since the last Magnuson-Stevens reauthorization, recreational anglers continue to be penalized as stock biomass increases. The red snapper fishery is as healthy as it's been in decades, with more and bigger fish in the fishery. Because the average weight and abundance of red snapper has increased, seasonal opportunities to access the healthy stock are further reduced each year in order to keep the estimated recreational harvest in pounds under an ACL that is several years old. Ultimately, the healthier the Gulf of Mexico red snapper population gets, the less anglers can fish. It is absurd to manage fisheries in this way. The current management system simply doesn't work and is an injustice for recreational anglers.

As a former state fisheries manager, I can tell you that poundage-based management is never even considered when managing game, waterfowl or most inland fisheries where similar challenges to developing accurate data exist.

Can you imagine a system where hard poundage quotas on squirrels, with in season monitoring, were implemented? Suppose the state of Louisiana was told they could only harvest 10,000 pounds of squirrel annually. Once they reached 9,999 pounds, they had to close the season or pay back any overages in the quota next year. That would be a nonsensical approach and hunters wouldn't stand for it. Yet, that is exactly what we do in marine fisheries management.

Let's accept the fact we are always going to use surveys to estimate the vast majority of the recreational harvest. The system is not perfect, but given the resource available it is a very good system that produces good estimates of harvest for the more commonly caught, important species. However, a couple of significant shortcomings will inevitably persist. The weakest parts of the recreational data collection system are the time lag necessary to produce harvest estimates and the conversion

of the recreational catch estimate to pounds. Unfortunately, the current management method preferred by NOAA is to measure harvest in pounds with a hard quota, implying that it is possible to have real time quota management when it is not. The result is that success of the current management strategies hinges on the weakest part of the recreational data collection system.

Instead of trying to force a management system designed for commercial fisheries onto recreational fisheries, NOAA should be tasked with developing a rational recreational fishery management system that uses the data available to us now. State fishery and wildlife managers have done it successfully for decades; one need only look at the highly effective management of speckled trout (which was the leading recreationally caught species at 51 million fish in 2011), red drum and striped bass. They are for the most part abundant, healthy stocks that are managed primarily by harvest rates rather than poundage quotas.

Let's look to successful management strategies that can effectively use the current data collections system, rather than continue to insist what is primarily a commercial fisheries management strategy will work for recreational fisheries. Inland fisheries stocks are successfully managed based on population information and harvest rates, not on biomass. The same successful tools can be applied to marine recreational fisheries management that still protect stocks while reducing costs and providing greater benefits for recreational anglers and the economy.

Aldo Leopold once said that conservation is a state of harmony between men and land. I don't think he would mind if we extended his vision to the ocean. The goal for Federal fisheries management should not be to create a system that unnecessarily severs our connection to the oceans. Our goal should be to create a management system that fosters trust and cultivates a state of harmony between the American people and our marine environment.

Clarification Addendum to Statement of Chris Horton

(ADDENDUM SUBMITTED MAY 29, 2013)

Although managing a fishery based on mortality or extraction rates, and not on poundage, may seem like a significant departure from the current management approach, in actuality it is not. If we stop thinking in terms of total allowable pounds we can harvest, and instead think of harvest in terms of a percentage of the population that can safely be extracted, we are essentially doing the same thing — keeping harvest below a level that would cause a population to be overfished. For recreational fisheries, a maximum fishing mortality rate (F) would become the MSY, and the actual target fishing mortality rate would be somewhere below that level as determined by the Commissions and the Council's SSC's. Contemporary estimates of harvest, effort and biological indices are necessary to adjust harvest regulations to achieve and maintain the appropriate rate of extraction from the recreational sector. With the improved ability for MRIP to collect fishery-dependent data, and with the state's ability to monitor population indices, these contemporary estimates of harvest and the effects on the population would be readily available to make adjustments to the fishing mortality as needed.

Implementing this approach in predominately recreationally allocated fisheries would be relatively simple by capping the current commercial harvest to an appropriate poundage quota, accounting for that mortality in the F estimate and establishing an appropriate target rate of recreational fishing mortality that, combined with the commercial harvest mortality, has an extremely low probability of exceeding F in any given year.

Where mixed-sector fisheries have both commercially important and recreationally valuable fisheries, there may need to be additional considerations. If the stock is rapidly rebuilding, again it might be possible to set the commercial poundage at or near current levels and allow recreational anglers to be managed for the remainder of the growing stock. While this approach wouldn't allow for additional commercial fishers to enter the fishery, it would ensure that those currently in operation would remain profitable and provide a product for American markets. However, this direct approach may not be possible for all the mixed-sector stocks. Where allocations were established decades ago, it may be necessary to re-examine quota allocations to determine the best value for the Nation based on current social, economic and environmental conditions. Actually, we in the recreational fishing community have been calling for an examination of allocations based on current values for several years now.

Ultimately, not all fisheries need to be managed on the proposed model. Some fisheries, especially those in the Pacific Northwest, may be appropriately managed

based on the current poundage-based system. However, the Gulf of Mexico and South Atlantic red snapper/grouper complex; summer flounder in the mid-Atlantic; black sea bass in the Mid and South Atlantic; and even black drum along the Atlantic seaboard are just some examples of where this management approach could be effective in solving many of the current problems associated with managing fisheries that are both recreationally and commercially important.

Dr. FLEMING. Thank you, Mr. Horton.

Dr. Stokesbury, you are recognized for 5 minutes.

STATEMENT OF DR. KEVIN D. E. STOKESBURY, ASSOCIATE PROFESSOR AND CHAIR, DEPARTMENT OF FISHERIES OCEANOGRAPHY, SCHOOL FOR MARINE SCIENCE AND TECHNOLOGY, UNIVERSITY OF MASSACHUSETTS-DARTMOUTH

Dr. STOKESBURY. Thank you. Thank you very much for the introduction. And I thank the members of the Subcommittee for the invitation to testify before you today.

I was asked to speak on fisheries data collection, specifically how we developed an alternative survey for the sea scallop fishery, and if similar techniques can apply for other fisheries.

The critical thing about managing fisheries is collecting accurate data. The Magnuson-Stevens Act gives control of data collection to NOAA fisheries. However, I think there are cooperative ways to collect accurate data, as well. The sea scallops stock has rebuilt from a low harvest of \$87 million in 1997 to landings worth about \$455 million annually, from 2003 to 2012. The current situation with the groundfish industry is in stark contrast to the scallop fishery.

Scientific uncertainties are huge, and many fishermen are saying this is it, it is over, it is the end of the fishery. How did the scallop stock rebuild so quickly? Can the groundfish stock rebuild, as well? To answer these questions, we need to be able to accurately measure the abundance and the spacial distribution of these animals.

The primary sampling tool for most fishery stocks in the U.S. are a trawl or a dredge. With them you can say there was an average of 1,000 scallops per tow in 2012. But this doesn't mean anything unless you have other tows to compare it to. This is a relative estimate of a relative estimate. What you need is an absolute estimate. Then you can say there were 4 billion scallops on Georges Bank in 2012, which clearly means something. You can compare that number to other years, other animals, and you can decide how many of them you would like to harvest. Under the Magnuson-Stevens Act, uncertainty in stock assessment leads to more conservative estimates of allowable catch.

I believe that the fisheries research should return to a fundamental principle of field ecology, seeking absolute measures, which is the numbers per unit area, and determining the associated uncertainties. For scallops, we set out to get an absolute measure. Working with the fishermen, we tried to avoid preconceived notions. We simply tried to estimate the number of animals at different sizes, and where they were located.

The fishermen outlined their historic fishing grounds for us. We had very limited funds, so sampling gear had to be cheap and readily available. And with that we developed a video quadratic sam-

pling pyramid and surveyed on a grid. Now we have completed 150 video crew surveys on Georges Bank and the Mid-Atlantic. All the vessels have been donated, as well as most of the food, fuel, and fishermen's time. Within each quadrat, 50 invertebrates and fish are counted, and the substrats are identified. Counts are standardized to individuals per meters squared, and these estimates are expanded by the area to give a population estimate.

Our first surveys were used to support the opening of the Nantucket Lightship and closed area one scallop grounds, instantly increasing the harvest by 5.5 million pounds, worth \$55 million. In 2003, we expanded our video survey to cover the entire scallop resource, and this doubled the estimate of abundance, which is worth approximately \$2.4 billion, U.S.

This system has been accepted by the National Marine Fisheries Service. It has been published in 25 peer-reviewed scientific papers, and over 100 students and fishermen have worked together on this research.

So what is the future? The biggest question in fisheries continues to be what is the relationship between the spawning adults and the new recruits. The trick is having the scientific techniques to see the recruits as soon as it occurs, and the management structure in place to act quickly and protect it. The Magnuson-Stevens Act should include this.

We are working on new ways to try and measure groundfish using acoustics and video techniques. We just conducted a preliminary survey placing a video camera system in the cod-end of a groundfish otter trawl. The results look promising, and we hope to develop into a full-blown survey. If so, it will sample an order of magnitude more sea floor than the conventional trawl surveys.

To me, the way forward is to get out there and work with the fishermen, measuring what is going on. If we can use new technologies to look at these populations clearly and simply, perhaps we can start grasping their underlying dynamics. There is still an incredible amount of potential in the wild fisheries of New England, and the infrastructure and people willing to and invested in figuring out how to make it work sustainably. Thank you very much.

[The prepared statement of Dr. Stokesbury follows:]

Statement of Dr. Kevin D. E. Stokesbury, Department of Fisheries Oceanography, School for Marine Science and Technology, University of Massachusetts Dartmouth

Fishery data collection, the example of the New Bedford scallop fishery.

I thank the members of the subcommittee for the invitation to testify before you today. My name is Kevin Stokesbury. I am a professor of Fisheries Oceanography, in the School for Marine Science and Technology at the University of Massachusetts Dartmouth. I was asked to speak on fisheries data collection, specifically how we developed an alternative survey for the sea scallop fishery and if similar techniques could apply for other fisheries.

The critical thing about managing fisheries is collecting accurate data. The Magnuson-Stevens Act gives control of data collection to NOAA fisheries. However, I think there are cooperative ways of collecting accurate data.

The sea scallop stock has rebuilt from a low harvest of 5,500 metric tons in 1998 worth about \$87 million to harvest above the estimated maximum sustainable yield. Landings from 2003 to 2010 averaged 26,000 metric tons worth about \$455 million, annually (Fig. 1). New Bedford has been the number one fishing port by value in

the U.S. for the last 14 years, due largely to scallop landings; the fleet landed \$289 million worth in 2010 and \$297 million in 2011 just in New Bedford alone (Fig. 2).

The current situation with the groundfish industry is in stark contrast to the scallop fishery. The latest estimates of New England groundfish stocks are incredibly low, reductions of 60 percent to 77 percent for Georges Bank and Gulf of Maine cod, respectively. Yellowtail flounder quota, which is divided between Canada and the U.S., is so low that it could shut down both the groundfish and the scallop fishery due to by-catch. The scientific uncertainties in these estimates are huge and many people are questioning the Federal surveys and stock assessments. Many fishermen are saying, "This is it, it's over." The end of the fishery.

How did the scallop stock rebuild so quickly? Can the groundfish stock rebuild as well? To answer these questions we need to be able to accurately measure the abundance and spatial distributions of these animals.

Estimating the abundance of marine species is difficult. Traditional fisheries assessments generally use modified commercial gear or fisheries landing data to provide relative abundance estimates recorded in catch per unit effort such as kg per tow. These sampling approaches generally focus on the target species of the fishery, and collect information on other species incidentally (by-catch). The efficiency and selectivity of these collections are usually unknown. Selectivity is the range of sizes and morphologies of individuals captured by a specific gear, and efficiency is the proportion of individuals caught by the gear compared to the total number of individuals in the gear's path (Stokesbury et al 2008). Relative estimates are relative only to themselves. You have to compare one year to another, and if you see a change you assume it is occurring in nature because your sample design is the same. However, if you know the efficiency of the sampling gear you can use it to calculate an absolute estimate, the actual number of fish in the sample area. Then if you know the total area your resource covers you can multiply these values to give you the number of animals in the resource. It is this number (or biomass if it is in weight) that managers use to set the total allowable catch for a fishery. "There was an average of 1,000 scallops per tow in 2012" doesn't mean anything unless you have other tows to compare it too. "There were 4 billion scallops on Georges Bank in 2012" clearly means something. You can compare that number to other years, other animals and you can decide how many of them you would like to harvest.

Each of the parameters has an associated error in measurement and these uncertainties are often so large that they frequently mask real changes in populations. Under the Magnuson-Stevens Act uncertainty in stock assessments leads to more conservative estimates of allowable catch.

I believe that fisheries researchers should return to fundamental principles of field ecology; seek absolute measures (numbers per unit area) and determine the associated uncertainties (Stokesbury et al 2008). I'll describe the implementation of these principles using a new technology to examine the sea scallop fishery of the Northeast United States.

The U.S. Sea scallop Fishery

Two spatial management changes drastically altered fishing distribution replacing the traditional unrestricted movement of the fleet from one scallop aggregation to another. In 1977, the Hague Line divided eastern Georges Bank between Canada and the United States. In 1994 three large areas (17,000 km²) of the United States portion of Georges Bank were closed to mobile gear fisheries in an effort to protect depleted groundfish stocks (Murawski et al. 2000). These changes substantially reduced the scallop grounds available to the fishing fleet and concentrated intense fishing pressure on the remaining open areas.

By 1998 the scallop fishery was facing severe restrictions. Fishermen were desperate for access into the large closed areas of Georges Bank that had supported their traditional fishery. However the National Marine Fisheries Service (NMFS) survey suggest that scallop abundance was not high within these areas (NEFMC 1999 SAFE Report page 93). There were several reasons for this: violation of the assumptions of the sampling design and huge uncertainties associated with the efficiency of the fishing gear used.

The NMFS scallop survey uses a modified New Bedford style commercial dredge towed by a scientific research vessel, and stations were selected using a stratified random survey design (Hart and Rago 2006). In a stratified random survey the population is divided into subpopulations which do not overlap and which together make up the entire population. The animals within each subpopulation are assumed to be relatively evenly distributed. Each subpopulation or "strata" is randomly sampled and then these values are combined. On Georges Bank, strata roughly follow depth contours. The establishment of closed areas cut across strata and with the

number of animals increasing within the closed area, the assumption of an “even distribution within strata” was violated. This results in taking only a few samples in areas that have high densities of animals.

Another problem is that there is a great deal of uncertainty concerning the efficiency of the dredge, how many scallops a scallop dredge catches, and how many scallops it leaves on the sea floor. Small differences may have large effects on scallop estimates, especially when you are using samples to extrapolate estimates for an entire population.

The SMAST sea scallop video survey

Working cooperatively with the scallop fishermen, we set out to develop a video survey using quadrat techniques based on SCUBA diving studies (Stokesbury and Himmelman 1993; 1995) that would provide spatially explicit, accurate, precise, absolute estimates of sea scallop density and size distributions along the off-shore northeast waters of the United States including the Georges Bank Closed areas (Stokesbury 2002; Stokesbury et al 2004).

In designing this survey we tried to avoid the preconceived notions of formal fisheries stock assessments, such as:

- 1) Estimating biomass rather than the number of individuals
- 2) Assuming homogeneous densities within survey strata.

We met with fishermen who outlined their historic fishing grounds. We had very limited funds, so sampling gear had to be cheap and readily available. In addition, we wanted a portable system, deployable from any commercial scallop fishing vessel, and we wanted to avoid the permitting process required to sample in closed areas with fishing gear, which often results in delay (or denial).

Three scientific principles guided our design:

1) *Scale*: According to scallop population biology sampling grain needed to be at the scale of cm (individual distribution) and to the extent of 100–1000 of km² (bed-level distribution) (Stokesbury and Himmelman 1993; 1995)

2) *Experimentation*: To measure the impact of the scallop fishery on the benthic habitats with a level of precision that allowed statistical testing a Before-After-Control-Impact experiment (Green 1979; Stokesbury and Harris 2006). We had to take enough measurements to be sure we could observe a change when it occurs.

3) *Continuity*: Sampling in an expandable way such that subsequent surveys would build a mosaic suitable for mapping benthic substrates and macroinvertebrates. We have added to our system with improved technology but we’ve keep the basic sampling unit the same so that all our samples can be compared to one another and combined.

We developed a video-quadrat sampling pyramid and selected a multistage centric systematic design with three station grid resolutions (1.6, 2.3 and 5.6 km). Since 1999, we have completed 150 video cruises surveying Georges Bank and the Mid Atlantic (>1,000 days at sea) We began sampling the entire resource in 2003 and have done so until 2012 (Fig. 3). The system is composed of a mobile video recording system compatible with any scallop vessel wheelhouse layout, an electro-hydraulic winch and a sampling pyramid. In its present configuration the sampling pyramid, supports four cameras and eight lights (Stokesbury 2002; Stokesbury et al. 2004; Fig. 4).

Within each quadrat, macroinvertebrates and fish are counted and the substrates are identified (Stokesbury 2002; Stokesbury et al. 2004) (Fig. 5). Counts are standardized to individuals m⁻². This procedure has been published in 25 peer-reviewed scientific papers.

Results of the video survey.

Small Scale surveys: Our initial work focused on estimating the density of sea scallops within the closed areas of Georges Bank. Sea scallops were highly grouped into patches (beds) on the scale of km² and strongly associated with coarse sand-granule-pebble substrates. The three areas surveyed contained approximately 650 million scallops representing 17,000 metric tons of harvestable scallop meats. These data assisted in developing an access program in 1999–2000 that provided an instant increase in harvest of 5.5 million lbs, worth \$55 million (Stokesbury 2002).

Large Scale Surveys: In 2003, at the request of the scallop fishing industry we expanded our video survey to cover the entire scallop resource in U.S. waters based on the footprint of the 2002 fishery. Sea scallop densities in the Mid-Atlantic and Georges Bank represented approximately 217,520 metric tons of scallop meats (approximately U.S. \$2.4 billion); twice that estimated by the NMFS (J. Boreman Director of NEFSC statement to The Standard Times, New Bedford, MA, USA, 4 No-

vember 2003). Sea scallops were highly aggregated in areas closed to mobile fishing gear. A large number of pre-recruit scallops were observed in the southern portion of the Hudson Canyon closed area extending south into open waters. This area, the Elephant Trunk, was closed in 2004 and sustained the fishery until 2011.

I don't think people realize what a cooperative effort this was with the fishermen, particularly the New Bedford fleet. We had no money for those first trips; they were all backed by individual fishermen, people donating their time, vessels, know-how, food and fuel. Now 150 week-long trips later and over 10 years of surveying the continental shelf from Virginia to the Canadian line 200 miles off shore on Georges Bank; that is still the case. The food, fuel, vessels and fishermen's labor are still all donated. The fishermen and my students have made our efforts a success. Our video survey is the largest in the world (that I know of). It provides an estimate of the numbers of scallops by size by location for the entire resource. This has enabled a rotational management plan that moves the fishing fleet around different closed areas on Georges Bank and in the Mid-Atlantic depending on how numerous and large the scallops are in each area. The system was presented at New England Fisheries Management Council sea scallop Plan and Development team meetings as well as the NMFS stock assessments. It was subjected to a number of critiques that resulted in further testing and development. Now, this system has been reviewed and accepted by the National Marine Fisheries Service and is combined with their research to provide yearly estimates of scallop abundance.

So "what is the future?" The closed areas may have played a part in the scallop recovery but there was also a huge recruitment in the Mid-Atlantic in 2003 that has sustained the scallop fishery for the last 10 years. There seems to be a cycle in scallop populations. The biggest scientific question in fisheries continues to be "what is the relationship between the spawning adults and the new recruits?" I think there are several underlying patterns to recruitment. There can be a relatively low annual recruitment equal to around 25 percent of the populations and then, when the correct environmental conditions occur, a huge year-class (Fig. 6).

That is what rebuilds a fishery. The trick is having the scientific techniques to see the recruitment as soon as it occurs and the management structure in place to act quickly and protect it. This just happened with scallops in 2012, we (our video survey and the NMFS scallops survey) saw another good recruitment in the mid-Atlantic and with the support of the fishermen, the management council quickly closed the area protecting the scallops and allowing them to grow undisturbed until they were ready to harvest. In considering the data requirements for the Magnuson-Stevens Act this should be considered, to look for and take advantage of significantly large year classes. It is very hard to rebuild a population with an average annual recruitment.

We're working on new ways to try and measure groundfish using acoustics and video techniques. We just conducted a preliminary survey placing a video camera system in the cod-end of a groundfish otter trawl to see if we could accurately identify and count the fish as they passed through (Fig. 7). The results look promising and if we can refine this technique we will be able to greatly increase the area sampled for groundfish, which should reduce the scientific uncertainty in these estimates. To me the way forward is to reduce the scientific uncertainty and the best way to do this is to get out there with the fishermen and measure what's going on. If we can use new technologies to look at these populations clearly and simply, perhaps we can start to grasp their underlying dynamics.

There is still an incredible amount of potential in the wild fisheries of New England, and the infrastructure and people willing to and invested in figuring out how to make it work sustainably.

I suggest the following criteria in designing surveys and experiments (Stokesbury et al 2008):

1. Always answer a question using a hypothesis driven approach with experimental design based on observations to determine the appropriate sampling design and scale; the temporal and spatial scales of the sampling design must match that of the hypotheses.
2. Use as much information as possible in collecting initial observations; include historic literature, perspective of non-scientists, and especially observations and perceptions from fishers and other resource users.
3. Start as simply as possible with a scalable sampling design and build a mosaic as knowledge increases.
4. Make your experimental design as adaptive to new technologies as possible; absolute measures are essential.
5. Incorporate spatial and temporal variability in your experimental design (strongly consider systematic sampling designs).

6. Use collection and analysis procedures that allow for the development and inclusion of your intuition and understanding of the ecosystem (automation can kill intuition) as well as new information and technology.

Thank you.

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Figure 1. United States Sea scallop landings (source: NOAA).

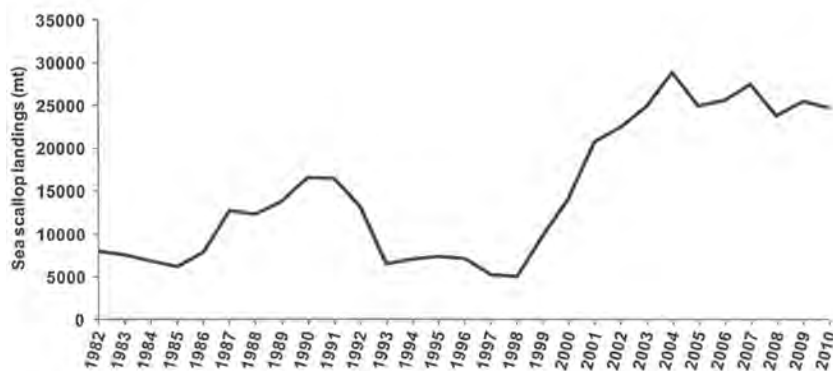


Figure 2. Deck load of scallops in the Nantucket Lightship area in 2006 during an access trip (photo by Brad Harris).



Figure 3. Map of the 2012 cooperative video survey, each dot represents 4 drops of the pyramid with 4 cameras recording data, red dots are the numbers of scallops per station.

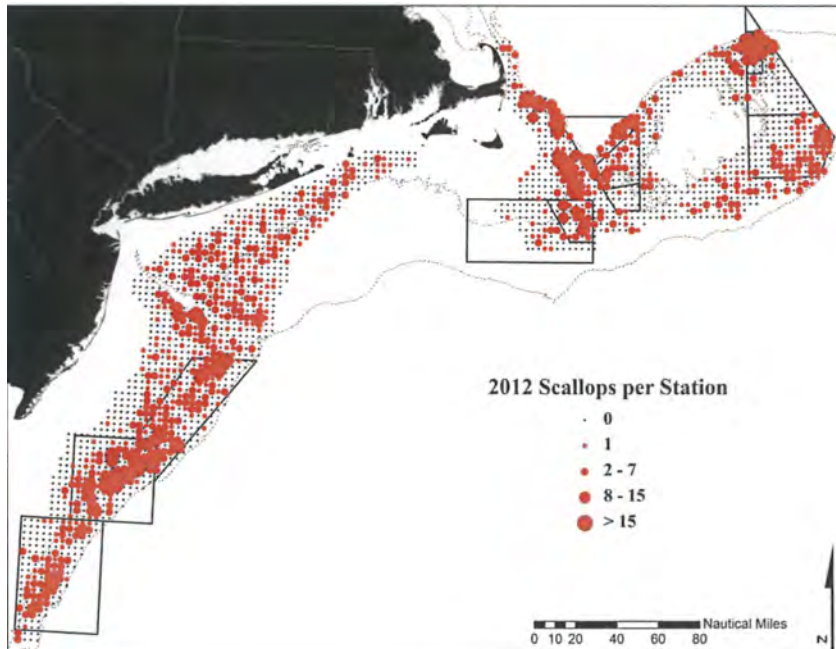


Figure 4. The SMAST video sampling pyramid mounted on the side of a commercial fishing vessel.



Figure 5. A digital still quadrat sample covering 1.13 m² with 11 scallops and 1 starfish.

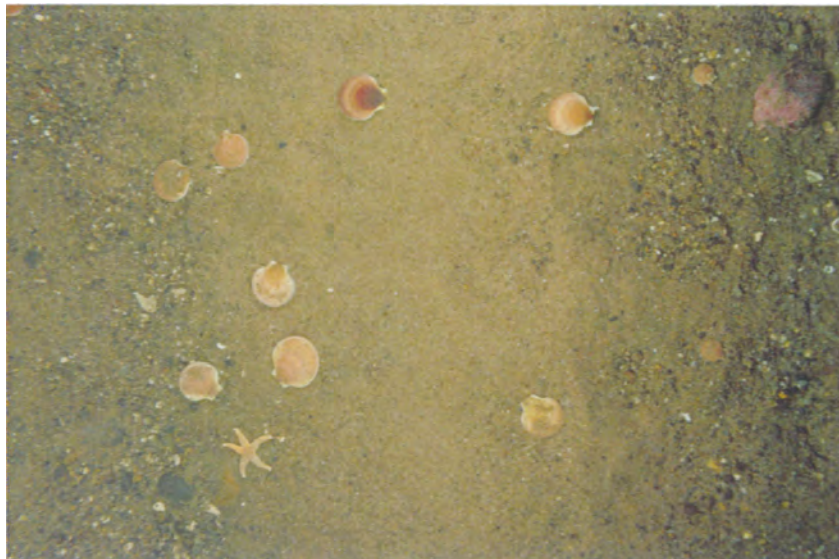


Figure 6. Recruitment of juvenile scallops from the sea scallop resource from 2003 to 2011 (Stokesbury 2012).

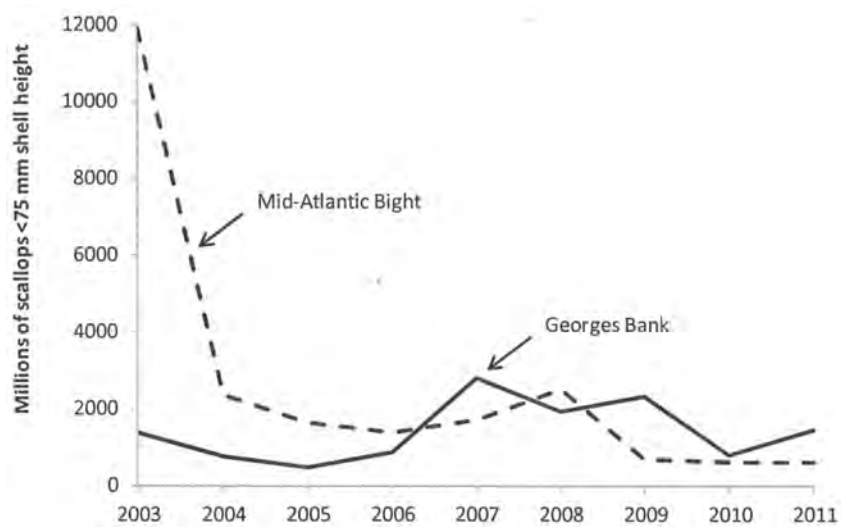
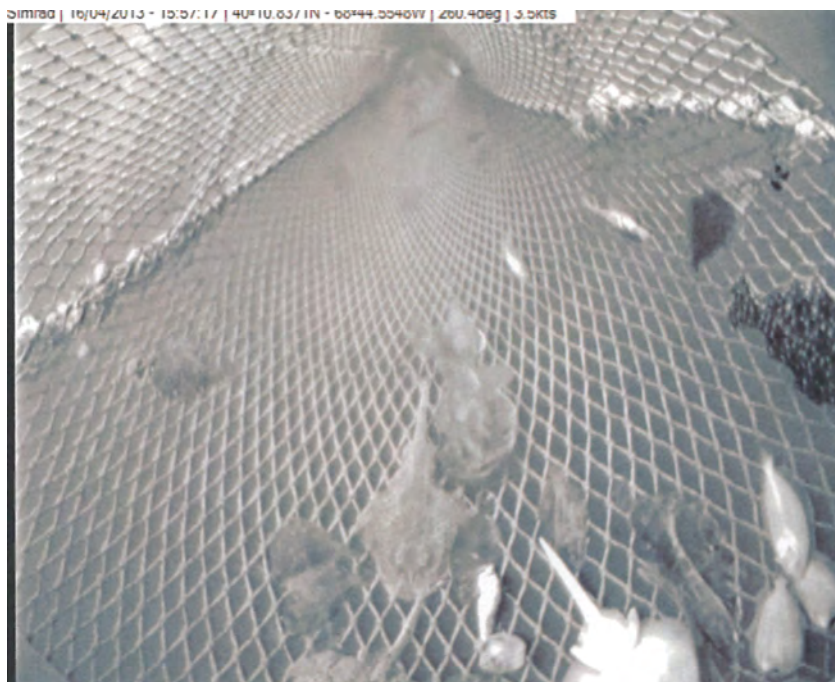


Figure 7. A Digital image of groundfish from a test system that may allow the sampling of fish as they pass through and then exit the net without damaging them.



Dr. FLEMING. Thank you, Dr. Stokesbury.

And finally, Captain Colby. You are recognized for 5 minutes.

**STATEMENT OF CAPTAIN MIKE H. COLBY, PRESIDENT,
DOUBLE HOOK CHARTERS, CLEARWATER, FLORIDA**

Mr. COLBY. Thank you, Mr. Chairman and Ranking Member and Subcommittee members, for giving me the opportunity to respond from a fisherman's perspective on data collection and how we move forward with MSA reauthorization. If I may quickly, I would like to recognize to the Ranking Member and your colleagues from the Pacific Rim that a week-and-a-half ago at the Managing Our Nation's Fisheries conference I had the pleasure of meeting some of those participants and staff in the Western Regional Council. It was entertaining and educational, and I felt that I needed to let you know that.

Mr. Chairman, in your kind invitation to me you indicated that you had three comments, questions, or overarching ideas that you wanted me to address to the Subcommittee. And I would like to do that one by one, if I can.

The first would involve your question about whether MRIP is operational and fully implemented. In terms of the full implementation, I know that we have small steps to go there. I think we have a mailing component that is going to be used, along with the phone canvassing, in addition to some other, I believe, enhancements to the dockside intercepts. So—and I would fully expect—and some fisherman think—that will happen certainly before the end of the year, or as soon as possible.

In terms of it being operational, from a fisherman's perspective—and I am a charter-for-hire operator—the transition from the old system to the new system for us is seamless. It is without controversy. I mean we are reporting, anyway. We have been reporting, anyway. So it was a very easy transition into the new system. And I think, again, the challenges will be, for us, to identify in the broad component of the recreational fishery who is using MRIP. Are they satisfied with it? Certainly we will need a query or some kind of census, if you will, to find out if fishermen are enjoying the system and find it easy to use, and are willing to cooperate with it.

The other was your interest in any new pathways or technology for data collection that we might use in reauthorization, or certainly use in the fishery. And we have one that is on our doorstep now, it is being used right now. It is right here, it is right on an iPhone, and it is called iSnapper. You can use it on an iPad or an iPhone. It has been tested several times by pilots using charter-for-hire fishermen in the Western Gulf, and some in the Northern Gulf.

And Dr. Greg Stunz and the Harte Research Institute, Texas A&M, Corpus Christi, developed this. It is menu-driven. It is dumb-proof. It is easy to use. The fisherman goes out with this, they log in, they give near-to-real-time, while-they-are-fishing estimates on catch and effort. On your way home you hit enter, and that is it. You can even go home and log in on the iSnapper website and look at a lexicon of your fishing activities over a period of time. It is a wonderful opportunity for recreational fishermen to become responsible and obligated to their fishery to use this.

I think if you put iSnapper with some other validation or documentation component—for instance, a fish tag—in terms of validating that self-reported data, the fish tag being used only for effort purposes, I think you have a powerful tool that will immediately result in us setting better ACLs, or rather better annual catch targets, accepted biological catch, making determinations of optimum yield. We now have the badly needed fishery-dependent data that we have been waiting for.

And the third thing was your question about whether I, as a fisherman, feel that MSA needs to be reauthorized, particularly in terms of data collection. And I think what I just said there was that if we already have those tools in place—the National Standard 2 is what it is. It is National Standard 2, requires the best-available science and data. It is time for fishermen to quit thinking of themselves as participants in the fishery, and become responsible for this fishery.

Bring fishermen to the table. Start putting in good, real-time, as best real-time data as we can. And I think you will see the workable Magnuson-Stevens Act that we need from them. Thank you.

[The prepared statement of Mr. Colby follows:]

Statement of Michael H. Colby, President, Double Hook Charters

Chairman Fleming, Ranking Member Sablan, and Members of the Committee, thank you for the opportunity today to speak to you today on the importance of data collection in sustainably managing our nation's fisheries. My name is Mike Colby and I have been a participant in the Gulf of Mexico fishery for the better part of 50 years. I spent many years part-time in the for-hire fishery while I was a contractor for the U.S. Fish & Wildlife Service and an adjunct instructor in the environmental sciences. In 1986, I received my first Merchant Mariners Credential and became a full-time operator in 1995. I have always felt that the charter industry was my pathway to becoming an ambassador for our fishery.

Over the past several decades, I began to see myself not just as a participant in the fishery, but as someone who is responsible for the fishery. This was a growth in perspective that I attribute to my background in the biological sciences and a true concern for natural resources. My involvement in current fishery management issues is the direct result of my vested interest in our fishery resources.

This hearing and last week's Managing Our Nation's Fisheries Conference call attention to the importance of sustainable fisheries to our coastal communities and economies. NOAA, the National Marine Fisheries Service (NMFS) and regional fishery management councils have made strides over the past decade to rebuild stocks and to end overfishing and increase the number of stock assessments and status reviews. Since 2000, 32 fish stocks have been rebuilt and many more have been assessed; 11 have been rebuilt since I last testified in 2011. The Magnuson-Stevens Fishery Conservation and Management Act is working and fish populations are rebuilding. This is good for fish, fishermen and the coastal economies that depend on a healthy resource.

Science based catch limits and accountability measures are key components of the successes we have seen on the water in ending overfishing and rebuilding fisheries. National Standard two of the Magnuson-Stevens Fishery Conservation and Management Act requires that "Conservation and management measures shall be based on the best available science." Data collection in the recreational and commercial fisheries forms the basis for the best available science used when managing our nation's fisheries.

As a young wildlife and fisheries student I can remember a fishery biologist telling me that he "never saw a perfect data set". He also reminded me that all data give us direction, trends and the need for more data. While I can think of no one who would argue the need for more reliable fishery data, we need to look at the existing science and scientific process we have now.

Existing Data Collection Methods for Gulf Recreational Fisheries

Three separate programs are used to sample and calculate catch and effort estimates for the marine recreational fishery in Gulf of Mexico: the Marine Recreational

Information Program (MRIP), Southeast Regional Headboat Survey (SRHS) and the Texas Marine Sport-Harvest Monitoring Program (TPWD).¹

Before we address MRIP, we need to address its predecessor the Marine Recreational Fisheries Statistics Survey (MRFSS). The Magnuson Fishery Conservation and Management Act² passage in 1976 mandated collection of data for both commercial and recreational marine fisheries by National Marine Fisheries Service (NMFS). NMFS established MRFSS as a program in 1979 to serve as a reliable data base for estimating the impact of marine recreational fishing on marine resources.³ A nationwide standardized data collection methodology and statistical estimation process began in 1981. All of the Gulf of Mexico states originally participated in MRFSS; however, Texas dropped out of the program in 1986 and returned to its original survey design. Louisiana, Mississippi, Alabama and Florida have continued to use MRFSS as their primary marine recreational fishery sampling methodology.

MRFSS was not specifically designed for management rather it was to estimate the impact fishing had on the resource; however, as this program was the main source for recreational fishery catch and effort, managers had to rely on it as there source of recreational information. As management needs evolved, MRFSS could not provide catch and effort estimates in a manner fitting to these needs. These concerns, and others, prompted a study by the National Research Council. In their final report, the NRC recommended a systemic overhaul of the survey methods of MRFSS and additional changes were mandated in the MSA reauthorization of 2006.

MRFSS was thusly rebranded 'Marine Recreational Information Program' (MRIP) and work began to redesign the survey. The redesigned system was supposed to be operational by 2009, however due to the complexity of the new system, it did not launch in 2013.

Marine Recreational Information Program (MRIP)

The goal of MRIP (and MRFSS) is to provide a reliable data base for estimating the impact of marine recreational fishing on marine resources.⁴ The function of the survey is to provide Fishery Management Councils, Interstate Fisheries Commissions, and State and Federal fishery management agencies to draft fishery management plans, to evaluate future demands on fish stocks, to predict and evaluate the impact of fisheries regulations, and to develop recreational facilities for anglers. MRIP, like MRFSS, calculates recreational fishery catch and effort estimates for all water areas (inland, state and EEZ) and all species of recreational take, including discarded species.

Two regions and some U.S. territories, the 15 Atlantic States and four of the Gulf of Mexico States (Louisiana, Mississippi, Alabama, and Florida) participate in MRIP.⁵ The west coast, Texas and Alaska do not use MRIP.

The basic design of MRIP is through two independent, yet complementary, surveys: a telephone survey of households⁶ and an intercept survey of anglers at fishing access sites. The telephone survey captures number of trips and other similar aspects; whereas, the intercept survey captures creel data, basic spatial data, time fished and avidity data.

The telephone survey is completed in a two-week period that starts the last week of each wave through first week of the following new wave. Participants asked to recall on a trip-by-trip basis all marine recreational fishing trips made within their state during the 60 days prior to the interview. The two month period was selected as it has been shown this is the limit of reasonable data recall by multiple studies. Important to note, the original design limited the phone survey to coastal households. As the NRC found, and other critiques, this biased the data and potential resulted in under coverage of the angler frame.⁷ MRIP addresses this issue and will use an angler license data base and some random digit dialing to account for unlicensed anglers to accomplish the same task. This should result in better coverage of the sampling frame (i.e., anglers).

The intercept survey consists of onsite interviews which gather catch and demographic data from marine recreational anglers in three fishing modes: party/charter

¹National Research Council. 2006. Review of recreational fisheries survey methods. Committee on the Review of Recreational Fisheries Survey Methods, National Research Council. The National Academies Press. 187p.

²16 U.S.C. §§ 1801–1884 (specifically § 303 & 304(e)).

³<http://data.recfin.org/mrfssov.htm>.

⁴http://www.st.nmfs.noaa.gov/st1/recreational/pubs/data_users/chap_1.pdf.

⁵As of 5/2013.

⁶Note: effort data collection will incorporate mail based interview methods possibly by 2014.

⁷National Research Council. 2006. Review of recreational fisheries survey methods. Committee on the Review of Recreational Fisheries Survey Methods, National Research Council. The National Academies Press. 187p.

boat, private/rental boat, or shore based (e.g., man-made structures, beaches, and banks). The Gulf of Mexico MRIP has not collected catch data from headboats since 1985. This is covered by a separate survey, the Southeast Regional Headboat Survey, run by NMFS/SEFSC in Beaufort, NC.

In the Gulf of Mexico, the Gulf States Marine Fisheries Commission (GSMFC) administers the survey. GSMFC is responsible for data entry.

MRIP Data Flow & Timeline:

MRIP calculates catch effort estimates in two month ‘wave’ periods. The following table and figure summarize the process. The gray shaded areas are the estimation period. In short, estimates, for any given wave, are not available until 45 days after the wave ends, e.g., May/June (wave 3) estimates are available August 15.

Step	Post Sample to Next Level	Example Receive Date
1	Field Data: 2–7 days to Supervisor	June 3
2	2 days to GSMFC	June 9
3	7–10 days to Data Entry	June 21
3.5	July Data: 12 days to GSMFC	July 22
4	7 days to Final Data Entry	July 29
5	Telephone Data to GSMFC	July 29
6	Estimate	August 15

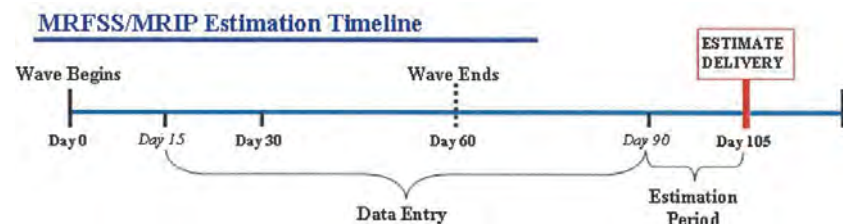


Figure 1. Generic timeline for MRFSS estimates. Based on Salz & Rossetti, 2011.⁸

MRIP was not designed as a management tool for in season management, it was designed to address the surveys biases identified in the NRC report. MRIP provides catch and effort estimates in six two-month waves, over a calendar year. The estimates for each wave are produced 45 days after the wave ends, e.g., May/June (wave 3) estimates are available August 15. A final annual estimate is produced approximately two months after the start of the year, essentially a re-run of the data to incorporate any corrections. Another important note is many fishing seasons are completed within a wave or straddle two waves. For example, the red snapper season is contained within a wave, but total catch estimates are not available until 45 days after the wave ends. MRIP does not have the ability to calculate in-season estimates or forecasts, which often leads to overfishing the quota in many species.

Marine Recreational Information Program (MRIP) is relied upon to predict catch per unit effort for the recreational angler; not an easy task given there were more than 3 million recreational anglers in the Gulf of Mexico in 2011. This model is commonly referred to by some fishermen as “junk science”. In August 2010 the Gulf Regional Council re-opened the Gulf red snapper season for a fall fishery after the BP Deepwater Horizon disaster based on data from MRFSS. The data indicated that the recreational quota had not been caught during the regular fishing season and that additional quota could be released to the recreational sector allowing for a fall fishing season. Recreational fishing organizations praised this decision. Yet, when MRFSS showed that a fishery closure was needed in the recreational greater amberjack fishery, it was dismissed as faulty data. Interesting, that the data are decried as “junk science” when they tell us what we don’t want to hear, yet applauded when they give us the outcome we want.

MRIP vs MRFSS:

While the NRC recommended a complete redesign of MRFSS to address survey biases, it did not dictate changes of monitoring a specific fishery. While NRC men-

⁸ www.countmyfish.noaa.gov/workshop/Salz_Rossetti_lag_timeliness_workshop—final.pdf.

tioned timeliness as a needed component, the NRC focused on methods to “improve its effectiveness and appropriateness of sampling and estimation procedures, its applicability to various kinds of management decisions, and its usefulness for social and economic analyses.”⁹

The purpose of MRFSS was to establish and maintain a reliable data base of recreational catch and effort to better understand the Nation’s impact on marine fisheries. The NRC report notes “[MRFSS] mission is to provide accurate, precise, and timely fisheries-dependent information for U.S. marine waters through the coordination and administration of recreational fisheries surveys nationwide;¹⁰” however, the term ‘timely’ is difficult to define. Each fishery has different temporal data delivery needs, some need monthly estimates, while others can operate on annual estimates. MRIP, like MRFSS, is designed to provide estimates for the entire marine recreational fishery and not the fine scale management units currently employed by fishery managers to meet conservation goals. The levels of sampling for a national survey lack the precision necessary for reduced spatial and temporal scales. Therefore, to provide estimates for specific fisheries, using the scope at which MRIP operates, is impractical.

For example, in-season management has the most need of timely data delivery to prevent overrun of quota. This requires, in general, sampling the fishery at a very high rate at a smaller geographic scale and greatly increases the cost.

Texas Marine Sport-Harvest Monitoring Program

The Texas program was established in 1974. The state was sampled by the MRFSS through 1985. The goal of this survey is to estimate participation in the Texas sport fishery. The primary focus of this survey is those anglers fishing in inshore and nearshore waters. There have been added components to capture EEZ fishery data, but at this time¹¹ is not a high priority with the state. Currently, Texas has not performed shore based (i.e., man-made structures and beaches) creel surveys due to budgetary issues since 1992.¹² The survey is focused on private boats and for-hire boats. Federally permitted headboats are sampled by the SRHS.

TPWD calculates catch and effort estimates based on field surveys. Unlike MRIP, Texas does not employ a phone survey component to obtain effort data. The components of the survey are an access point intercept survey for angler information and catch data and a roving count of effort at boat ramps.

Whereas MRIP produce estimates based on a calendar year, TPWD does not. The basic timeline of TPWD’s survey is based on High-Use (May 15–Nov 20) and Low-Use (Nov 21–May 14) seasons. Meaning, Texas does not follow the more common used scheme of Jan–Dec, but rather May to May. In general, final estimates are published 3–4 months after the survey year ends. Estimates are therefore a combination of 7 months of the first calendar year and 5 months of the following.

Data Flow & Timeline

Step	Post Sample to Next Level	Example Reveal Date
1	7 days	June 7, 2011
2	2 months	August 7
3	Final estimate (annual)	June 1, 2012

Southeast Regional Headboat Survey

The SHRS has been administered since 1972 and is the one of the longest recreational fishery time series in the U.S.¹³ This survey started in the Gulf in 1986. The first goal of this survey is to collect, dockside, biological samples (length, weight, otoliths, etc.) from headboat landings. This is the primary source for SEDAR and stock assessment age-growth structures.¹⁴ The second goal of this survey is logbooks from each of the headboats. Crew completed logbooks are a mandatory re-

⁹NRC.

¹⁰National Oceanic and Atmospheric Administration. 2005. *NOAA Recreational Fisheries Statistics Program*. [Online]. Available: <http://www.st.nmfs.gov/st1/recreational/index.html> [2013, May 14].

¹¹May 2013.

¹²Mark Fisher, TPWD’s Science Director, stated they were to complete these surveys every 10 years.

¹³Brennan, Ken, Southeast Region Headboat Survey Program Description. SEDAR 24, South Atlantic Red Snapper Data Workshop, April 28, 2010.

¹⁴<http://www.sefsc.noaa.gov/labs/beaufort/sustainable/headboat/>.

quirement for all federally permitted headboats. Each boat must report, on a trip by trip basis, such information as location, anglers, fish (A, B1 &2).

Data Flow & Timeline

There are two components to the survey, biological specimen collection and logbook data. SEFSC samplers sample headboat catch to obtain biological data and obtain the logbooks from the vessels. Logbooks not collected by the sampler are sent to the Beaufort Lab monthly.¹⁵

Step	Post Sample to Next Level	Example Receival Date
1	7-30+ days	July 1, 2011
2	14 days	July 15
3	2-4 months	Sept-Nov
4	~3-4 months post new year	March or April 2012

Improving Data Collection in the Recreational Fishery:

MRIP cannot address all the challenges with recreational data collection. With sufficient participation it can estimate catch and effort but to go above and beyond MRIP and improve timeliness in the data we need to have better industry and angler engagement. Recreational anglers have traditionally been participants, but as a user group that can have such a large impact on the resource, it is time that we fulfilled our role as stewards. Fishery managers are working to address problems on the water and it is now up to industry and anglers to find solutions that work for the fishery. There are a variety of methods we could employ to better track recreational catch effort

1. *Increase funding for data collection and monitoring:* U.S. commercial and recreational fisheries represent a multi billion dollar industry and supports millions of jobs. Congress should invest in fish and fishermen through increasing funding for fisheries management. Increased funding would help provide additional stock assessments, an important tool in setting ACLs; improve recreational data collection and monitoring; and facilitate cooperative research.

2. *Promote innovation in fisheries data collection:* One of the key ways NMFS could improve data collection without the need for Congressional legislation is to explore the use of modern, electronic methods for collecting data from fishermen. Electronic data collection can be more timely, accurate, and cost effective compared to traditional sampling methods. Recently a pilot study conducted by the Texas A&M Corpus Christi Hart Research Institute demonstrated that data could be collected from for-hire fishermen using a mobile device, in this case an iphone, and sent directly to the NMFS. This application collected catch, discard, location, fishing effort, and economic data. This data collection platform called *isnapper* has shown great promise in several pilot programs within the charter for-hire sector. Isnapper is a self-reporting electronic program that enables the user to collect and report on a daily basis. Using a tag or other harvest documentation in conjunction with isnapper could likely give managers the higher certainty in recreational harvest data that is needed. Congress should support efforts to modernize our fisheries data collection by funding efforts to expand these types of programs to support region-wide implementation.

3. *Use tags to measure effort:* Tags are used to measure effort in numerous ways from land based hunting to salt water game fish like snook and tarpon. Tags can be used to supplement monitoring and enforcement and provide data on fishing effort. For the purposes of this testimony, tags would be used to estimate effort only and *not* to control effort.

4. *Bring fishermen to the table:* This is where recreational fishing advocates and participants answer the challenge of improving fishery dependent data and collection. MRIP provides the platform, and now fishermen need to provide the near to real time harvest data that fishery managers need. As stewards of the resource it is incumbent on us to provide as much information as we can to state and Federal managers. Lack of information does not mean management efforts will cease; it unfortunately requires managers to estimate the needed information for reliable harvest numbers. I have heard from fishermen who are reluctant to participate in creel surveys (dock side intercepts) and many times do not participate in the random phone surveys. Our challenge is to inform fishermen of their obligation to provide

¹⁵Note: As of 2014, all headboat logbooks will be electronic and sent on a more timely basis (weekly).

badly needed fishery dependent data. As users of a public resource I believe it is our obligation to report our impact on that resource.

Conclusion

Our Nation's fishery resources are an integral part of our coastal economies and cultural heritage. Healthy fisheries not only promote strong business and coastal jobs but also our way of life. Nationwide, progress is being made to end overfishing and as we look to reauthorize the MSA we need to ensure that we work to improve the law and not roll back the key conservation measures that are workings. Many of the ideas I have suggested can be done without reauthorizing the law and we would see benefits on the water sooner. Innovation in data collection and management that works for our country's fishing public will ensure the long-term prosperity in our coastal fishing communities. Thank you for the opportunity to share my thoughts on this important issue.

Dr. FLEMING. Well, thank you, Captain. And thank you, panel, for your testimony. At this point we will begin questions for our witnesses. And again, to allow all Members to participate, Members are limited to 5 minutes for their questions. However, if Members have additional questions, we can have more than one round. I now recognize myself for 5 minutes.

Dr. BREIDT, I have a question. And just a quick response is all I need. I don't want to spend a lot of time on it. But what is the gold standard, when it comes to surveying a fish population? I mean there is—we have talked about different techniques, newer techniques. We have self-reporting, we have electronic monitoring. What is—if you had the perfect, or near-perfect test, and you had all the money and the time in order to perform it, what is the gold standard, from a statistical standpoint?

Dr. BREIDT. Yes. The gold standard would be—recalling that we are not trying to survey fish, but actually survey catch, we are trying to estimate catch—so if you had a complete, universal frame so that you could go out and find every fishing trip, every fish caught, sample those—you told me I had all the resources in the world? Well, then, I would measure every fish. But since I don't have that, I need to take a sample, a representative sample, so that I can generalize from that sample to the population. And I want to do that by some probability mechanism, where I know the probabilities. If data are sort of volunteered to me, I don't know those probabilities, so I can't extrapolate to the whole population. But if you really give me all the resource in the world, I will just measure everything.

Dr. FLEMING. So measuring the actual catches would give you the best data, if that were theoretically possible.

Dr. BREIDT. If you could just track every single fish that was harvested, and know that every released fish—you knew whether it lived or died, then you would be done.

Dr. FLEMING. So, really, the goal here is to find one or more methods that correlates best with the results you would get from that, I would infer from your statement, then.

Dr. BREIDT. Yes. And I think that if you have other methods that you want to bring in, other data sources, then if you have some baseline that includes representative sampling, then there are ways to do that. But without that baseline, it is hard to know how to assess the relative contributions of those different data sources.

Dr. FLEMING. Right. OK, thank you. Mr. Horton, if NOAA were to continue to manage the commercial fisheries in the Gulf—like red snapper, for instance—the way they have been, how could they

change the way they manage and allocate to the recreational sector without allowing too many fish from being taken and sending us right back into a situation that we have already been, over-fishing.

Mr. HORTON. Sure, Mr. Chairman. You know, the methodology or the strategy we are proposing works really well right off the bat, right out of the gate, it would work well for predominantly recreational fisheries. The striped bass example, Atlantic striped bass example that Congressman Hastings gave—or that Congressman Wittman mentioned earlier, is—that was pretty much an 80/20 percent—80 percent rec, 20 percent commercial. So it was fairly easy to implement in that regard. And there are other recreational fisheries that are predominantly recreational that, again, it would be fairly easy to implement.

There are some fisheries, like red snapper and some others, that are significant commercial fisheries as well as significant recreational fisheries. Can it be implemented there? Arguably, yes, it could. Would it require or potentially require a revisiting or re-examination of allocations? Yes. There is a potential we would have to re-examine allocations. And many of these allocations were determined years ago, decades ago. And I think the recreational fishing community in a way has been calling for a re-examination of those allocations, based on the latest social, economic, and environmental conditions and the changes we have had over the years.

Dr. FLEMING. OK, thank you. Let me ask you another question, Mr. Horton. You suggest that recreational fisheries be managed using a harvest rate. Would this change require a change in the Magnuson-Stevens Act?

Mr. HORTON. That is a good question, Congressman.

Dr. FLEMING. In your opinion. I mean, obviously, you are—

Mr. HORTON. I think what it would have to do—there would have to be some provisions, basically. We are not talking about writing specifically this—managing based on fishing mortality into Magnuson-Stevens. I think giving the councils and the commissions the latitude, like we do at the Mid-Atlantic striped bass fishery, to be able to manage a fishery that way, give the councils and the commissions the ability to do that, I think is the direction that we would like to see it go.

Dr. FLEMING. OK, thank you. The Chair recognizes the Ranking Member, Mr. Sablan.

Mr. SABLAN. Thank you very much, Mr. Chairman. And let me—Mr. Horton, before we let you go, I have one other question.

You pointed to management of terrestrial game as a model for management of marine recreational fisheries. And many game programs operate by requiring hunters to tag and report all animals harvested. Would you support a tagging program to help data collection in the recreational sector for important species like red snapper?

Mr. HORTON. Honestly, I think that would be a very difficult program to implement, again, just because of the sheer numbers of recreational snapper fishermen that are out there.

Whenever you talk about tag reporting from a terrestrial aspect, typically we are talking about big game and big game management. We are not talking about—what would be comparable, I guess, to a snapper fishery would be water fowl harvest or dove—

you know dove harvest, or dove seasons, where there is no tag reporting requirement for—

Mr. SABLAN. Thank you.

Mr. HORTON [continuing]. Those particular species.

Mr. SABLAN. I have 5 minutes. Thank you very much, though, Mr. Horton.

Now, Dr. Stokesbury, welcome. You also talked about a couple of different data collection techniques that you have used, working with fishermen, to gather high-quality data at a low cost. So, in your opinion, are these type of solutions going to be necessary to meet our fisheries assessment and management challenges in the absence of a stronger Federal funding commitment? And could you or can you describe in greater detail the potential advantages of your video trawl technology?

I'm sorry, English is my second language—did you get my question?

Dr. STOKESBURY. I get—

Mr. SABLAN. My two questions are, in your opinion, are these types of solutions going to be necessary to meet our fisheries assessment and management challenges, in the absence of a stronger Federal funding commitment, and can you describe in greater detail the potential advantages of your video trawl technology?

Dr. STOKESBURY. Yes. To answer the first question, I think they are. And I think even with more Federal funding, you are going to have to take that type of approach. As long as the fishermen and the scientific surveys disagree and argue over how it is being done, you are always going to have problems. And I think that we need to move forward.

And I believe that the preliminary survey we did with the trawl video work is a step in the right direction, because we did have a member of the Marine Fisheries Service out there with us, their expertise helped with this. Now, that system is not rocket science, it is simply putting a video camera—Simrad donated the camera—and we basically just constructed a frame that we put in the cod-end of a otter trawl. And the idea is to count the fish that go through. And if you can get that count to be the same as if you dumped the fish on the deck, then you can trawl continually. And so you can increase the amount of—where most scientific tows are only a half-hour long or so on Georges Bank, you could tow continually. And so you could greatly increase the time your net is in the water, and that would reduce some of the spatial holes that are presently in the survey.

Mr. SABLAN. All right, thank you. And I got to go to Captain Colby, because he has taken the time to meet my people.

But Captain, Mr. Horton claimed that it is an injustice to recreational fishermen that, as the Gulf red snapper population gets healthier, anglers are allowed to fish less. While the population of red snapper may be growing, it is far from being rebuilt, and only a few years removed from being over-fished. Aside from abundance, what other measures are there of fish stock health, one. Number two, do you think they are moving in the right direction with the current management system by assessing the data and following the science, especially since the annual catch limit is increasing every year?

Mr. COLBY. Thank you, sir. I think abundance is certainly one index that gives us an idea of, I guess you could say, a healthy fishery, or at least, excuse me, is one—abundance is one index to certainly give you the idea of if it is a healthy fish or perhaps, more appropriately, a thriving fishery.

When you look at other parameters like fecundity and age class structure, then you start getting a clearer picture of how a fishery looks, at least to a fishery biologist, in terms of its relative health. Gil McCrae, in our Florida Fish and Wildlife Commission, gave an interesting talk on the biology of red snapper. And, yes, we are seeing large numbers of red snapper. Fortunately, many of those in that population are teenagers.

And, unfortunately, with a teenage red snapper—certainly one that can start spawning at 18 inches—the genetic fitness of that larva is far less than if you get up into the higher poundages, say 18, 20, and 25-pound egg-bearing females, who have a long-term genetic fitness for larval survival. Everything else in between are classes of fish that we need to see moving in to the next 2 or 3 or 4 years before we can actually say this is a healthy population of red snapper.

If you roll in the unknowns in the BP oil spill, in terms of how that will affect fecundity of our egg-bearing females, you may have a recipe for caution, in terms of how we analyze that population.

Mr. SABLAN. All right. So—the Chairman is generous enough to allow me one more question. So, Captain, what are the potential downfalls of managing a stock like red snapper, based on harvest rates rather than on pound and space quotas?

Mr. COLBY. Well, I would agree, certainly, with Dr. Merrick, that there are iterations—or rather, internal derivations that we could do, going back from numbers to weight. The problem with that is it is kind of like passing a note among yourselves, and all of you asking to rewrite the note. You lose something in the translation every time that note is done.

So, if we take away weight, which is certainly one of the tools we use to estimate spawning stock biomass, let's say, which helps validate the SPR, particularly for red snapper, if you go back to doing it with a harvest rate, the rate of removing an individual from a population, you are going to go through some changes in terms of the certainty of that information.

And I believe that if you want to manage, if you want to assess a population of fish and manage it by rate of renewal, you darn well better be spot on with your stock assessments, because you are right back having the same problem as canvassing the recreational fishermen to gain that data of the rate of removal. High peak periods, low peak periods, when are people fishing? We are right back to the problem of having recreational fishermen step up to the plate and be responsible for—

Mr. SABLAN. Thank you, Captain. The Chairman is generous, but he is not that generous. But I just—

[Laughter.]

Mr. SABLAN. Let me just make one observation, because you are agreeing with Dr. Merrick. And Dr. Merrick, apparently, and I need to have a meeting with Ms. Bordallo to determine how he values fish in the Pacific region, a region that supports the economy

of South Korea, Japan, Thailand, and apparently, he feels that there is more value of fish elsewhere than in the area we live. But thank you very much, Mr. Chairman. Thank you, everyone, for being here.

Dr. FLEMING. The gentleman yields back. And I want to thank the panel for your valuable testimony today in answering our questions. Hopefully we are getting closer to better solutions to these problems. They have certainly been vexing ever since I have been on Natural Resources, which is now over 4 years.

The hearing record will remain open for 10 days, so we might submit more questions in writing. So we would ask that you respond likewise.

There being no further business before us, and without objection, the Committee now stands adjourned. Thank you.

[Whereupon, at 12:48 p.m., the Subcommittee was adjourned.]

