NOAA, Society, and the Economy:

An Assessment of NOAA'S Social Science Capability and Needs

July 18, 2013
Silver Spring, MD

Contributing Authors:
Peter C. Wiley
Linwood Pendleton
Tracy Rouleau
Brent Ache
Nancy Beller-Simms
Rita Curtis
Cecile Daniels
John Gaynor
Charlie Morris
Toni Parham
Avery Sen
Jennifer Sprague
Ariana Sutton-Grier

Table of Contents

Figures and Tables

Figures

Tables

Executive Summary

NOAA provides the science, service, and stewardship the Nation needs to react to and plan for a constantly changing natural environmental. To achieve its mission, NOAA needs to know how people, institutions, and society make decisions that depend on environmental conditions. NOAA also needs to know how society uses the data, science, and products it provides and furthermore, it needs to achieve this understanding with the same scientific rigor it brings to all aspects of its scientifically-based enterprise.

The social sciences[1] can contribute toward achieving NOAA's mission but only if NOAA marshals the resources and capacity to tackle this challenge. In 2003 and again in 2009, the NOAA Science Advisory Board (SAB) found that the representation and utilization of social science in the agency were insufficient, and that social sciences continue to be underrepresented in NOAA's research, operations, and decision making. NOAA committed to this assessment in our response to the 2009 SAB report on Social Sciences, "Integrating Social Science into NOAA Planning, Evaluation, and Decision Making: A Review of Implementation to Date and Recommendations for Improving Effectiveness". Since then, much progress has been made in the development of a social science capacity at NOAA. There is a more wide-spread acknowledgment at the agency that an understanding of the social and economic elements of our work is crucial to effectively carrying out our mission. Yet there are still significant, broad ranging gaps in the social science capacity needed to meet the Agency's mission needs.

Social sciences continue to be underrepresented in NOAA's research, operations, and decision making. (NOAA SAB, 2009)

In this white paper, we set out to understand the degree to which NOAA's social science capacity is sufficient to meet its needs and if not, where more resources and effort need to be invested. To do this, we ask:

- How can social science aid NOAA in achieving its mission?
- What are the immediate and future needs for social sciences, especially within the line offices[2]?
- What is NOAA's capacity for conducting social science?

There are considerable challenges in answering these questions. These include the recognition that social science includes many fields and social scientists may be trained in interdisciplinary disciplines that did not even exist a few years ago. Within the agency, it is difficult to determine

[1] Social science is the process of describing, explaining and predicting human behavior and institutional structure in interaction with their environments (as defined by the NOAA Science Advisory Board), and includes the following disciplines: sociology, anthropology, geography, economics, psychology, political science, and communications.
[2] This assessment includes all of the NOAA Line Offices, NOAA Headquarters and the Office of Marine and Aviation Operations. For the sake of brevity, we refer to this group throughout this assessment as "LOs."

whether a social scientist has the latitude or time to conduct social science. Many social scientists hold managerial and leadership positions. Finally, the most pressing social science needs of the LOs at NOAA differ substantially as does their capability to harnessing social science methods. Combined these challenges make an accurate representation of NOAA's social science capacity and needs difficult. Here we take a first step towards quantifying the Agency's capacity to conduct social science and assessing what the Agency believes are its social science needs, and gaps that should be filled quickly if the Agency is to make good use of social science to meets its public mission.

How can social science aid NOAA in achieving our mission?

Social science is necessary, at some level, in almost every aspect of what NOAA does, from research to operations and decision making. The agency needs to know how people respond to weather forecasts, how they derive benefits from the services provided by coastal and ocean ecosystems, how society and commerce will respond to climate change, and what factors affect the resilience of coastal communities. These are all issues fundamental to NOAA's mission and none of these issues can be clearly understood without social science. NOAA's ability to constantly improve its capacity to meet its core mission requires social science. There are legislative and governmental mandates that explicitly call for social science. These mandates include those related to economic and social data collection, modeling, assessment, and analysis. Social science methods also provide the tools that can help the agency make better decisions about where investments, innovations, and resources can be deployed throughout the agency to better meet its mission goals that are directly related to people.

What is our need for social science?

While each LO serves different constituencies and provides different scientific data and expertise, all of the line offices have the same core needs for social science. The most fundamental of these are:

1. The requirement to provide social and economic data collection and analysis to meet our legal mandates.
2. The provision of the social science data society needs to better understand, manage, and steward the nation's oceans, coasts, atmosphere and climate (e.g. data on ocean and coastal economic conditions, estimates of the impacts of storms, etc.).
3. The need to understand how NOAA affects society (e.g. who uses NOAA data, how, and to what effect; conducting impact studies on management and regulatory actions) in order to:
    a. constantly improve NOAA's science, service, and stewardship (e.g. designing data, tools, forecasts and processes that better meet society's needs);
    b. make strategic and investment decisions; and
    c. better communicate to the public how the agency contributes to the social good.

What is the gap between our capacity and need?

The demand for more social science analysis comes from inside and outside the agency. Congress and OMB frequently ask for information on how NOAA contributes to the performance and effectiveness of the nation's commerce. Regional fisheries management councils, regional ocean planning bodies, and coastal managers demand data on human uses of marine and coastal resources. As private and public sectors become increasingly accustomed to using NOAA science and data, they demand more and better environmental science to manage business and public life.

NOAA leadership at the headquarters and line office levels understand these demands, but the data and science are on missing. Where social science capacity exists, this assessment found that staff is consistently unable to keep up with the growing demand for social science. NOAA is unable to demonstrate quantitatively the effect of its actions on society's wellbeing and economic productivity, even when anecdotal evidence of societal benefits is readily evident. A recent review of the Economic Statistics of NOAA found that there are very few studies that concretely quantify the way in which society utilizes NOAA products and services and even fewer that attempt to value these activities. Additionally, the culture of NOAA has been slowly evolving toward an understanding of how social science must be integrated in order to achieve the agency's mission. Part of the need for social science includes the need to address how the social and economic aspects of what NOAA does are perceived by NOAA leadership, congress, OMB and our partners and constituents.

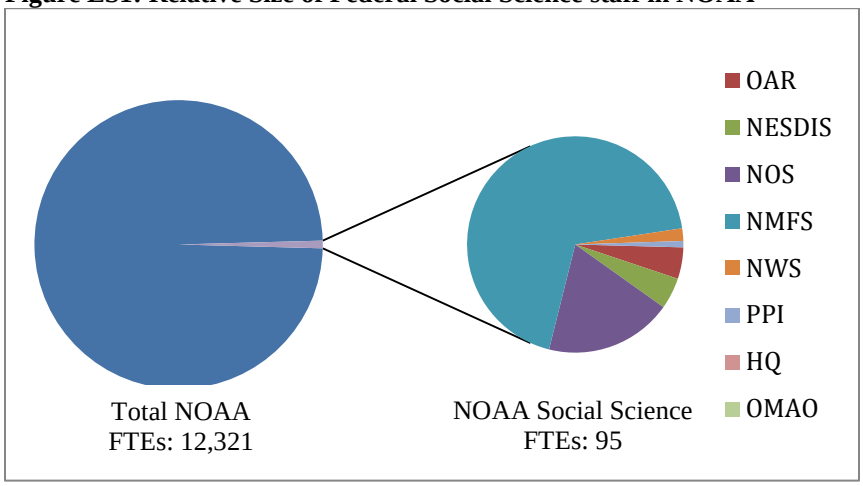
This assessment provides a detailed description of needs and gaps in NOAA's social science capacity required to meet current high-level risks for each line office as well as a vision of a fully operational social science capacity that could be leveraged to improve the capacity and expertise of NOAA to meet its mission goal (Appendix B and Appendix C). The main report focuses on critical and high priority gaps in NOAA social science capacity – gaps that should be filled to meet core NOAA mission goals, and provide strategic information for more effective planning and budgeting. More specifically, social and economic research, data collection, analysis and assessments are needed to meet our legal mandates. Expertise in risk behavior and risk communication is needed to improve weather and climate products, tools to improve coastal resiliency, and processes to mitigate the impacts of coastal storms and hazards. Valuation of NOAA's programs, products, and services, as well as valuation of ecosystem services, is a critical gap that cuts across all of NOAA. Finally, an increased interdisciplinary expertise, that is social science expertise, combined with knowledge and experience in climate science, coastal processes, and/or meteorology would allow NOAA to provide more pertinent and actionable information for decision-makers.

*This report does not propose **how** NOAA should fill the gaps, but rather only attempts to define them.*

The gaps described in this assessment are provided in terms of personnel, personnel costs and external funding needed to cover immediate risks and to make NOAA social science fully operational. They take into account other sources of capacity, such as partnerships, cooperative institutes, grants, and inter-agency efforts, but recognize that planning, implementation and application of these types of capacity will take a certain amount of in-house capacity and expertise. Furthermore, increasing this capacity does not necessarily require acquiring more in-house staff for NOAA. For example a budget-neutral option to increase capacity could include using attrition and the repurposing of existing positions to fill the gaps or leveraging internal or external grants or partnerships. All references to staff in this report reflect this recognition. This report does not propose ***how*** NOAA should fill the gaps, but rather only attempts to define them.

One way to look at the relative scale of social science in NOAA is through the federal workforce. This does not provide insight with regard to gaps, as was mentioned above, but it does provide some context for the significance of social science in NOAA in terms of the Federal workforce. As can be seen in Figure ES1, there are 95 Social Science staff in 2011, as compared with the total staff of 12,321. Social Science staff were 0.8 percent of the total.

Figure ES1: Relative Size of Federal Social Science staff in NOAA



In the past responses to the SAB, NOAA has been hesitant to commit to filling gaps because it was unclear where social science was most needed and what the required investment would be. With the information contained in this assessment, those decisions can be made from a more informed perspective and strategically included in NOAA's budget and planning processes. As one can see in the Social Science Needs and Gaps section, there is a range of gaps depending on the particular LO. Some have been using social science for years and have a well-developed sense of how social science fits in to their mission. Other LOs have gaps that represent a significant potential for social science data, tools and activities where currently none exist.

What is our capacity for conducting social science?

In-house, federal and contract staff are the cornerstone of the human side of NOAA's social science capacity, but they are by no means the whole story. NOAA's social science capacity also

includes those outside the agency who are supported by contracts and grants, partnerships, cooperative institutes, and inter-agency agreements. Data exist only for one component of NOAA's social science capacity – federal employees in social science job series. While these data are helpful in describing the core of social science capacity, they do not reflect the important role played by contract staff, federal employees who may be involved in social science research or activities but who are not in social science job series, or the external social science resources available to NOAA.

Conclusions and Recommendations

Many of the social science data, analysis, and tools that are required are common across NOAA functions, programs, and line offices. NOAA must continue to do a better job of using its existing strengths in social science to inform research, operations, and decision making across the agency to achieve efficiency and effectiveness. This will require constant improvements in the coordination of existing social science within the lines, better integration of a broad spectrum of social science disciplines in NOAA decision-making, and better organization of social science across the lines. Some new social science capacity must be added, especially in the line offices where social science capacity is now weak or non-existent. High-level social science leadership at NOAA must be permanent, have the ear of NOAA leadership, and be given the resources needed to guide the growing social science capacity of the agency.

Many of NOAA's social science needs are not research oriented, but involve the regular application of social science to decision-making at NOAA...

The major recommendations are as follows:

- *Repurpose the Research Council Social Science Committee to be the NOAA Social Science Committee that will strategically advance, coordinate, and guide NOAA's social science research, operations, and decision making.* This committee would subsume the functions of the existing NOAA Research Council Social Science Committee and would be expanded to include staff knowledgeable about how social science capability is incorporated into operations and decision-making, and that have the ability to identify and leverage opportunities for social science in NOAA day-to-day functions. It would have a dual reporting role to the Chief Economist and to the Research Council.

  The critical aspect of this Committee is an ability to understand how social science capability is incorporated into operations and decision-making and to identify and leverage opportunities for social science in NOAA day-to-day functions. Many of NOAA's social science needs are not research oriented, but involve the regular application of social science to decision-making at NOAA, its partners, and its constituents. Having both research and operations and decision-making expertise on the

social science committee will allow it to make strategic recommendations on how to best utilize social science in NOAA's research, operations and decision making.

- *A Process for Moving Forward.* The first order of business for the NOAA Social Science Committee should be to develop a concrete plan to fill the gaps outlined in this report, to develop a concrete strategy and criteria for the evaluation of gaps, and begin to implement a plan for the following:

    - *Fill Critical Gaps.* Many of the gaps identified put NOAA at risk of not fulfilling its legal mandates and reduce our ability to meet our science, service, and stewardship responsibilities. Strategies should be identified through the SEE and budget processes to fill those gaps as quickly as is feasible, and should be considered for inclusion in a future budget request. In addition, budget neutral options such as integrating efforts across lines to reduce costs, or leveraging or repurposing existing funding and/or grant programs and staff should be considered. For instance an interim alternative may be to fund social, behavioral, and economic (SBE) science studies through the various Cooperative Institutes, and Sea Grant programs.

    - *Periodic Social Science Needs Assessments.* Now that NOAA has been through the process of compiling the information necessary to understand the agency's current social science capacity, needs, and gaps, it will be easier in the future to collect the same information. This will help NOAA determine its status in meeting its social science needs and the trend it is following regarding social science capacity, using this assessment as a baseline. A periodic assessment will be critical to ensuring that NOAA meets its social science needs. The NOAA Social Science Committee should conduct the assessment every two years. Deep dive assessments for critical NOAA offices and programs should also be prioritized and executed.

Introduction

NOAA provides the science, service, and stewardship the nation needs to react to and plan for a constantly changing natural environmental. To achieve this mission, NOAA needs to understand how people, institutions, and society make decisions that depend on environmental conditions. The agency also needs to know how society uses the data, science, and products the agency provides to the country and it needs to achieve this understanding with the same scientific rigor it brings to all aspects of its scientifically based enterprise.

NOAA does not have a long history of integrating the social aspects of its work with its science. The first uses of social science[3] in NOAA were related to very specific notions of how NOAA activities or regulations impacted the public from an economic perspective. Later, social science was applied to cases when the resources for which NOAA is responsible were damaged, to inform how they might be made whole again. Although important, these were very narrow pictures of the social and economic aspects of NOAA's mission. As other applications for social science data, tools and expertise were identified, there came a realization that a more comprehensive approach to social science aspects was needed. This realization arose as a result of additional disciplines being brought to bear, additional issues involving socioeconomic elements being raised, and social science being better coordinated.

In 2003 and again in 2009, the NOAA Science Advisory Board (SAB) found that the representation and utilization of social science in the agency were insufficient, and that social sciences continue to be underrepresented in NOAA's research, operations, and decision making. Progress has been made over the years and there is now a more wide-spread acknowledgment at the agency that an understanding of the social and economic elements of our work is crucial to effectively carry out our mission. However, there are still significant, broad ranging gaps in the social science capacity needed to meet the Agency's mission needs. There have been calls, notably by the Science Advisory Board, for a certain percentage of the agency's total budget to be dedicated to social science. This suggestion, however, was not implemented by the Agency largely because it was not based on any assessment of the need for social science.

This report provides an assessment of social science needs and capacity in NOAA. At NOAA, decisions about the hiring of social scientists and the application of social science to NOAA activities resides largely in the Line Offices (LOs) and the program offices that serve NOAA headquarters. In Appendix B, specific social science needs assessments are presented for each LO[4]. Each assessment includes:

- a description of mandates for social science;
- a quantification of current social science capacity; and

[3] Social science is the process of describing, explaining and predicting human behavior and institutional structure in interaction with their environments (as defined by the NOAA Science Advisory Board), and includes the following disciplines: sociology, anthropology, geography, economics, psychology, political science, and communications.
[4] This assessment includes all of the NOAA Line Offices, NOAA Headquarters and the Office of Marine and Aviation Operations. For the sake of brevity, we refer to this group throughout this assessment as "LOs."

- a statement of need:
    - that addresses immediate risks, and
    - that would makes social science at NOAA fully operational.

This main report summarizes the LO assessments, and presents recommendations for a path to move forward. This summary, including explicit documentation of social science needs and capacity, provides the baseline information the agency needs to properly respond to the SAB's call for increased investment in social science from an informed perspective. This assessment also provides information on the potential consequences of not making these investments.

Background

In April 2009, the NOAA Science Advisory Board (SAB) released a report entitled, *Integrating Social Science into NOAA Planning, Evaluation and Decision Making: A Review of Implementation to Date and Recommendations for Improving Effectiveness* (herear referred to as the 2009 report), based on a review of Social Science in NOAA by the SAB Social Science Working Group (SSWG) in 2007-2008. This work took place against the backdrop of a similar report in 2003, and measured the progress made in implementing the recommendations contained in the 2003 report. The fundamental finding of the 2003 report, that the capacity of the National Oceanic and Atmospheric Administration (NOAA) to meet its mandates and mission is diminished by the underrepresentation and underutilization of social science, was found to still hold true in 2009.

One of the central findings of the 2009 report was that NOAA does not have sufficient knowledge of either its capacity to conduct social science or its need for social science tools, data or expertise. Specifically, the 2009 report found that, "A precise accounting of social science positions within NOAA is difficult because NOAA does not fully understand what constitutes a valid social science presence and moreover lacks a tracking system for social science position categories." In order to address this concern, the SAB included in its assessment: Recommendation 4.2: "NOAA should conduct a formal needs assessment to determine its needs for social science staff and research by program, and determine the appropriate mix of internal and external staffing to meet these needs." In response to these findings and to Recommendation 4.2, NOAA has undertaken the assessment contained herein.

Assessing the Need for Social Science in NOAA

Representatives from each LO were asked to carefully describe how social science is used in their office, where needs exist but remain unmet, and how they envision the optimal application of social science to mission needs within their respective LO. This section summarizes the status, needs, and gaps of NOAA's social science applications, research and activities. Appendix B covers this information in detail for each LO.

Assessing the current social science capacity within NOAA is challenging for several reasons. Social science capacity at NOAA takes many forms. The only available data on social science capacity is from the NOAA Workforce Management Office. While these data are helpful in describing federal employees in social science job series, they do not provide information necessary to identify those federal employees who may be involved in social science research or activities and who are not in social science job series. Additionally, the capacity to conduct social science research and provide social science data, tools, and technical assistance at NOAA is heavily reliant on contract staff, partnerships, cooperative institutes, and inter-agency efforts – about which there is no reliable information. Of these latter categories, no data source exists that is consistent from LO to LO.

How can social science aid NOAA in achieving our mission?

One of the most important questions to ask at the outset of an assessment of any particular capacity is "Why do we need it?" This question can be answered in several ways, but the existence of mandates for social science, or mandates for elements of NOAA's mission that could not be done without social science, is a key piece of information. A quick scan through the Appendix B reveals that social science is, at some level, present in almost every aspect of what NOAA does, from research to operations and decision making. If we were to list all of the mandates that, directly or indirectly, call for social science, the list would go on for pages. For the purposes of this summary, it will suffice to highlight some of the major mandates and policy drivers for social science research and activities.

Legal Mandates. One of the most important reasons for an agency to engage in any specific activity is a legal requirement to do so. For social science, there are several legal mandates that specifically call for social science. These include the following[5]:

- Magnuson Stevens Act
- Regulatory Flexibility Act
- Endangered Species Act
- National Environmental Policy Act
- Coastal Zone Management Act
- National Marine Sanctuaries Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Oil Pollution Act

The nature of these mandates is inherently related to the interactions between humans and the environment and they require social science information, analysis, and support in order to meet them. They include language that necessitates social science capacity and they cannot be met without this capacity.

There are also a significant number of indirect legal mandates for social science research and activities. These laws call for activities that could not be undertaken without social science information or analysis. Again, this list of drivers covers a broad range of the work in which

[5] This list is not comprehensive or representative. For a complete list, see the individual line office sections in Appendix B.

NOAA engages. See Appendix B for descriptions of the legal mandates relevant to individual LOs.

Strategic Documents. Other factors that influence NOAA's priorities, and particularly the need for social science, are the documents that lay out the Agency's priorities and strategy for achieving our desired goals and outcomes. These documents start with legal mandates and translate them into priorities, goals and objectives. The most significant of these are the *Next Generation Strategic Plan* (NGSP), and the *Annual Guidance Memorandum* (AGM). Both of these documents contain significant references to social science priorities and outcomes.

The Next Generation Strategic Plan (NGSP). The NOAA vision, as described in the NGSP, calls for "*Healthy ecosystems, communities, and economies that are resilient in the face of change*." This vision for the agency describes a state that could neither be achieved, nor measured, without social science research, data, tools, and technical assistance.

NOAA's mission also is made up of integrated societal and economic elements. This can be seen in the language supporting the mission statement. The italic emphasis is included to highlight these elements.

> "NOAA… … supports private enterprise with the information *necessary to sustain economic growth*."
>
> "NOAA is a global leader in understanding the processes by which ecosystems provide *services crucial for human survival* on Earth, and in helping to educate businesses and Federal, State and local decision makers about how the *health of human society* and the health of the environment are interconnected."

Each of NOAA's Long-Term Goals also contain elements that could not be achieved or measured without a strong, well-coordinated social science capacity. The first two goals are Climate Adaptation - described as "An informed society anticipating and responding to climate and its impacts" – and a Weather Ready Nation – described as "Society is prepared for and responds to weather-related events." Without social science, NOAA could not effectively inform society or predict or influence its response to climate and weather-related events, or their impacts. The same can be said for the Healthy Oceans goal – "Marine fisheries, habitats and biodiversity are sustained within healthy and productive ecosystems". The agency ensures healthy and productive ecosystems by managing human influences on those ecosystems. Additionally, one of the ways NOAA measures the productivity of ecosystems is through the services they provide to humans. Again, these elements require social science capacity. Finally, the Resilient Coastal Communities and Economies Goal ("Coastal and Great Lakes communities are environmentally and economically sustainable") could not be achieved or assessed without social science research, tools, data, and technical assistance.

Finally, NOAA Enterprise Objectives also call for the application of social science to achieve agency objectives. For example, NOAA's Science and Technology Enterprise includes the statement, "Acquire and incorporate knowledge of human behavior to enhance understanding of the interaction between human activities and the Earth system." including historical ecology as

well as history and archaeology. This enterprise goal also includes humans in its definition of "biological components."

The Annual Guidance Memorandum (AGM). The AGM is one of the key strategic drivers for NOAA social science. The purpose of the AGM is to "… focus the agency's corporate attention on near-term execution challenges and a balanced implementation of NOAA's strategy across mission areas given our mandates, stakeholder priorities, and the fiscal outlook." There are several references in the AGM to social science priorities and outcomes that require the use of social science research, data, tools and technical assistance.

One of NOAA's Near Term Execution Imperatives in the AGM is "Evolve NOAA's weather services to become more effective, efficient, and agile." This imperative includes a call to "… improve and streamline operations and create an NWS that continues to lead the Nation's weather preparedness in the 21st century", using the results of a National Academies of Science report[6] which includes improvements to the public's awareness of and response to extreme weather dependent events, which requires a significant and sustained social science capacity. The imperative also calls for the use of "… social science methods to develop and test service enhancements to motivate and support better human responses to warnings."

In the climate arena, social science methods will be needed to effectively adapt to climate impacts. An example of this is the climate Focus Area for Planning: "Strengthen the production and delivery of climate information and services to inform the management of climate-related risks." Particularly relevant is the plan to "… focus cross-line office efforts and partnerships to increase access to authoritative information about the regional-scale impacts of a variable and changing climate on the key societal challenges of water resources, coastal inundation, weather and climate extremes, and marine ecosystems." Another Focus Area for Planning, "Improve ocean and coastal stewardship by focusing habitat efforts in priority areas and demonstrating landscape-scale results," states that "NOAA will increase focus of its and resources for science and conservation actions in targeted areas to maximize benefits to marine resources and communities, especially in fostering economic vitality." An understanding of these benefits to communities and effectively planning to foster economic vitality will require an explicit understanding of the connection between conservation actions, communities and economies.

Finally, in the Focus Area for Planning, "Enhance research and modeling to advance NOAA's mission," the AGM states that "NOAA will determine and forecast socio-economic benefits provided by ecosystems and the impacts of management actions on ecosystems and ecosystem services." This will require the integration of ecological and social science elements to understand how changes to ecological function can affect the socio-economic benefits of ecosystem services.

[6] National Academies of Science, 2012. *Weather Services for the Nation: Becoming Second to None*. Committee on the Assessment of the National Weather Service's Modernization Program; Board on Atmospheric Sciences and Climate; Division on Earth and Life Studies; National Research Council. National Academies of Science: Washington, DC. 90 pp.

Social Science Needs and Gaps[7]

Needs

The LOs differ not only in their mission, but in their experience in the use of social science. As a result, the LOs are at different stages in their thinking about how best to use social science to meet mission goals and internal decision making needs. A comprehensive set of needs for each LO is articulated in Appendix B, however, concise summaries for each line are presented below.

NMFS and NOS each have several mandates that require the use of social sciences to achieve their mission, and as such have been using social science for years. This more mature capacity and these capabilities allow NMFS and NOS to articulate a well-developed description of how social science fits into their mission, and to fully understand what they need in comparison to what they currently have in the way of capacity.

A key responsibility of the NMFS economic and social science capability is to conduct mandated social impact assessments, economic impact analyses, and economic benefit assessments in support of almost 300 Rules each year. In support of these management actions, NMFS is also tasked with designing and managing the commercial and recreational economic and socio-cultural surveys and data collections for each of the 47 federal fishery management plans. In addition, and as discussed in Appendix B, the economic analyses underpinning regulations to protect and rebuild marine protected species and restore habitat must take into account the full suite of benefits (use and non-use) as well as the potential costs to private businesses and households, which results in a very different suite of data requirements and analyses. Further, mandated economic assessments of catastrophic disasters such as Sandy place further requirements on the program. Lastly, as NOAA shifts towards an ecosystem-based management approach, emerging needs for NMFS include new data and models to value ecosystem services and assess the trade-offs from alternative management decisions.

There are many elements of the NOS mission that have a human component. These are difficult to generalize because the missions of the Program Offices are so diverse. However, a good working knowledge of the things NOS does - products, services, processes, or other activities - that require social science can help NOS understand what its needs are and ultimately better integrate the social science expertise that is needed to support those elements. NOS needs social science expertise to conduct socioeconomic research, and to develop tools and analysis that improve decision-making and assess management strategies and regulations across several programs. NOS also needs the capacity to conduct social science surveys to improve products and services, conduct damage assessment and remediation, and to measure the benefits to society from its products and services. In addition, NOS needs economists to assess the economic value of coastal and ocean resources, and to continue to provide the suite of economic tools and viewers that make high profile economic data on the coastal and ocean economy available to the public.

[7] See Table 1 for a summary of capacity and gaps by LO.

The other line offices have far less experience using social science. While social science needs are described in this assessment for OAR and NWS, these LOs have far less experience with social science; their needs are less clearly articulated than those of NMFS and NOS. OAR and NWS also have few clear mandates for social science and as a result less in-house capacity and experience regarding social science.

To best target research and create new knowledge that will benefit society, OAR needs interdisciplinary expertise and capacity that combines physical (e.g. climatology) and biological science expertise with social science expertise to provide actionable science. For instance, the Climate Program Office within OAR needs the expertise and capacity to use social science methodologies to better understand the users of climate information, as well as their needs, to determine how and why they use (or don't use) NOAA climate products, how decision makers could better incorporate climate information into their resource management routines, and how NOAA could better convey climate forecasts and information to decision makers. OAR also needs some increased capacity in the social sciences to effectively coordinate and design extramural research with its partners to meet the research needs that support NOAA's mission.

The two high priority areas where NWS has identified social science needs and gaps are in the areas of Risk Communication/Behavior and Economic Valuation. NWS needs to provide effective communication of risk and forecast confidence in its products and services for better decision-making, and a comprehensive understanding of how its Core Partners (emergency management community, media, etc.) and the public perceive and use data and services. NWS also needs to better integrate social sciences into operational processes so that communication tools and decision support tools incorporate risk communication/behavior concepts before they are operational. Finally, NWS needs a comprehensive understanding of user decision processes and risk tolerances so it can best design forecasts and related products so they can meet the needs of the public, emergency managers, and planners.

Two of the LO's, NESDIS and OMAO, do not have any legal mandates that require the use of social science, and social science is only minimally connected to their mission objectives. Rather, as part of their core mission, they support programs and activities in other LOs that require social science. However, both of these LO's need valuations of their programs, products, and services. Both NESDIS and OMAO need to demonstrate that the way they conduct business achieves the highest benefit to society.

Some needs for social sciences cut across many line offices. For instance, the LOs have expressed the need for a risk behavior and communication specialist to help NOAA design integrated tools and data to improve coastal resiliency and help to mitigate the impacts of coastal storms and hazards. This gap cuts across multiple lines and is listed in Appendix B as a priority need for NOS's Coastal Service Center, OAR's Climate Program Office (CPO), and for NWS. NOAA priorities, including the recovery from Hurricane Sandy and efforts to improve coastal resiliency, future storm assessments, and the development of weather and climate decision support services and systems, would all greatly benefit from an increased capacity to analyze and communicate risk.

Valuation of NOAA's programs, products, and services is a critical need that cuts across all of NOAA. Valuation of our fleet services, and our satellite programs is a critical need for OMAO and NESDIS as well as for the Line Offices they support. Valuation of our ports products and services, of hydrographic surveys and nautical charts, of marine planning and effective coastal management strategies, and the value of improved water quality to human health and society all serve NOAA's mission. Valuation of ecosystem services and NOAA's ability to identify the best investments in the stewardship of natural capital aligns with Administration efforts to understand and leverage the value of environmental capital, and is needed to implement ecosystem-based management and increase the resilience of coastal communities and economies. Valuation of our programs, products, and services can also help NOAA to make strategic and effective investment decisions.

Indeed, much of NOAA's work requires the integration of science, stewardship, and service across the line offices. Not surprisingly, the core needs for social sciences described by the LOs also exist at a higher level to fulfill the needs of these enterprise level activities. NOAA Headquarters and its Office of Program Planning and Integration need social science to communicate NOAA's value, to design strategies to guide the work of the entire organization, and to produce NOAA-wide social science information that meets the same high standard as other data at the agency. The corporate level need for social science at NOAA is greater than the sum of the line office needs.

Gaps

As NOAA's uses of social science vary widely across LO's, so do the major gaps in social science expertise. Some of these gaps pose a high risk for NOAA and hinder our ability to fulfill legal mandates and to effectively provide the science and services the nation needs to plan for and react to a constantly changing environment. Others gaps have left NOAA incapable of adequately quantifying and communicating the societal importance of it science and services. These valuations of the societal impact of NOAA are needed to inform Congress of the value that NOAA contributes to society, to allow NOAA to better plan and manage our fiscal resources, and to constantly strive to produce science, service and stewardship that improves the wellbeing of the nation. Here we summarize the major gaps in social science capabilities across NOAA. For full descriptions, please see the LO sections in the Appendix B.

The gaps described in this assessment are provided in terms of personnel, personnel costs and external funding needed to cover immediate risks and to make NOAA social science fully operational. They take into account other sources of capacity, such as partnerships, cooperative institutes, grants, and inter-agency efforts, but recognize that planning, implementation and application of these types of capacity will take a certain amount of in-house capacity and expertise. Furthermore, increasing this capacity does not necessarily require acquiring more in-house staff for NOAA. For example a budget-neutral option to increase capacity could include using attrition and the repurposing of existing positions to fill the gaps. All references to staff in this report reflect this recognition or leveraging internal or external grants or partnerships. This report does not propose ***how*** NOAA should fill the gaps, but rather only attempts to define them.

While NMFS has substantial social science capacity (96 staff including federal and contract), its needs for social science are great and the line office has identified gaps in social science that are critical and put NOAA at risk if not filled. In FY12, the NMFS Economics & Social Science Research budget line was cut 30% from $10.7M in FY11 to $7.4M in FY12. This decrease was roughly equivalent to the Program's increase in FY10. Accordingly, the Program's budget priorities identified and the rationale behind them are much the same as those identified in the FY10 President's Request: 10 staff and funding for data collection and the development of social and economic decision support tools. While the funding was cut, the need for these resources increased, further widening the gap. In particular, the number of Rules issued by NMFS has not declined and the number of catch share programs, a market-based approach to management that requires substantially more economic assessments, increased. Gaps also include the need for funding to advance development of decision support tools that assess the economic impacts of commercial and recreational fishery regulations, enabling the Agency to work "smarter", i.e., more cost-effectively. In addition, three national-in-scope decision support tools NMFS currently has underway support marine spatial planning or, more specifically, fishing ground closures (FishSET); a recreational fisheries economic decision support tool for evaluating management options (BLAST); and a social indicator / community profiling web-based tool that support social impact assessments. These decision support tools will aid in rigorous assessment of the trade-offs from marine spatial management strategies that restrict fishermen's access to fishing grounds, provide essential information for making allocation decisions, and improve assessment quality, while reducing the time required to run an assessment 20- fold, dramatically reducing labor costs.

With current capacity, NOAA Fisheries cannot meet legal mandates requiring economic and social impact assessments with current resources. Given the economic and social data collection, modeling and assessment requirements for supporting Rulemaking, it is clear that current staff is stretched too far and cannot keep pace with these demands. ***Currently, the Agency is only meeting 55% of its commercial fisheries economic data collection requirements and roughly 30% of its recreational fisheries economic data collection requirements.*** NMFS needs to dedicate 10 additional staff to meet its current goals.

Similarly, NOS has a moderate and widely distributed social science capacity (28 staff including federal and contract staff). However, at the same time, NOS has a very high demand for social science and, as a result, the line office identifies a gap in social science capacity of 14 staff. This lack of capacity translates into the inability of program offices to meet the requirements of specific social science mandates. Gaps in staffing affect regional capacity to conduct social science in support of National Marine Sanctuary management, response and restoration functions, and general capacity to address the economic and behavioral aspects of community resiliency relative to changes in ecological condition, as well as coastal storms and hazards (a gap also reported by OAR and NWS). Further, NOS does not presently have the capacity it needs to estimate the societal benefits of NOS products and services, including the value of coastal and ocean research (an agency-wide gap). Finally, NOS lacks the social science capacity to quantify and value ecosystem services and, thus, is challenged to fully understand and help steward coastal and marine environmental capital, and to provide the tools and products needed for ecosystem-based management, both of which align with Administration priorities.

OAR's assessment of its social science gaps reflects a lack of interdisciplinary expertise rather than pure social science. OAR must dedicate at least two additional social science in order to provide: more pertinent and actionable information for decision-makers; capacity to increase public understanding of the impacts of climate change and the health impacts of poor air and water quality; the information available to support preparation, adaptation, management and/or response to changing climate and environmental conditions; and specific information for planning by sector and region. Social science capacity is currently inadequate to best identify, coordinate and develop social science research to support NOAA's mission - a gap for OAR.

The NWS also lacks a robust social science capacity. NWS especially lacks the interdisciplinary social science capabilities required to best fulfill its mission. NWS does not have the internal capacity in personnel or funding to develop a comprehensive understanding of how the public perceives and uses weather data and services or to incorporate societal impacts into the forecast process. Additionally, NWS does not have the social science capacity to estimate the societal value of NWS products and services; to understand and communicate risk behavior; and to estimate the economic impacts of weather events. NWS requires a minimum of three social science staff in order to begin to close the gap in its social science capacity. NWS has been able to fill some of the gaps by collaborating with external partners on research areas relating to risk communication, however the ability to get the research into operations and the lack of dedicated funding to social science has stymied the growth.

Social science has traditionally fallen outside of the perceived purview of NESDIS and as a result it has a very small social science staff. Nevertheless, it is increasingly clear that the line office has a growing need for social science (an estimated 12 social science staff) and does not have the capacity to meet these needs. NESDIS lacks the social science capacity that can help the line office design environmental satellites to collect the data most needed by society. NESDIS also does not have sufficient social science capacity to quantify, monitor, and communicate the value of its goods and services

OMAO's does not have any social science capacity. It lacks the ability to assess the economic and social aspects of its emergency preparedness and response support functions, technical standards development, and educational activities. OMAO also cannot adequately quantify the social benefits that arise from its processes, products and activities. Nevertheless, OMAO does not need a full-time in social science, but could make use of social science capacity elsewhere at NOAA.

Until recently, PPI has lacked the basic social science capacity needed to fulfill its role in social science leadership at the agency, including its advisory capacity to senior NOAA leadership. PPI has not had a full-time, permanent federal Chief Economist or other senior social scientists since 2007. Without a full-time senior social scientist, PPI has been unable to develop and implement an innovative, NOAA-wide economic and social science research agenda that advances the Departments goals and NOAA's most pressing valuation and social science needs. PPI also has not been able to adequately represent NOAA on the many inter-agency committees that require a Chief Economist or equivalent. PPI has not always been able to provide NOAA leadership with the economic and social science data it needs to communicate with Congress and the public.

Furthermore, because of the wide ranging nature of social science at NOAA, PPI requires more than just a Chief Economist or its equivalent. PPI needs a staff of senior economists (2 staff) and 2 more junior staff who can work with the Chief Economist and the line offices to better coordinate social science and social science capacity across the agency. PPI also needs a small, but capable senior staff to conduct research, provide leadership for cross-line office initiatives, and to prepare NOAA-wide materials that communicate the societal importance of NOAA.

Social science, especially the ability to understand and communicate the value of NOAA, has become part of an ongoing and high-level need for NOAA HQ. Nevertheless, there is no permanent social science position at HQ. NOAA HQ finds that it needs at least two dedicated social science that can provide risk assessment and risk communication expertise, assist with education assessments, and help leadership manage for and communicate the societal value of NOAA's products and services, as well as studies about NOAA's user behavior.

Table 1 (below) provides a summary of the gaps identified by the LOs in Appendix B and summarized above. These gap estimates provide the personnel, personnel costs and external funding needed to cover immediate risks and to make NOAA social science fully operational. They take into account other sources of capacity, such as partnerships, cooperative institutes, grants, and inter-agency efforts, but recognize that planning, implementation and application of these types of capacity will take a certain amount of in-house capacity and expertise. These estimates reflect this recognition.

Table 1. Summary of Social Science Capability and Gaps *

				Gaps					
	Current Capability			Covering Immediate Risks			Fully Operational		
	Staff	Staff Funding	External Funding	Staff	Staff Funding	External Funding	Staff	Staff Funding	External Funding
OAR	8	1,125	17,480	2	300	8,250	21	3,150	17,280
NOS	29	3,220	1,853	14	1,568	2,900	42	4,704	5,960
NMFS	96	11,900	6,680	10	1,600	6,680	56	9,280	6,680
NWS	3	336	1,104	1	112	250	30	3,360	2,000
NESDIS	6	694	700	5	560	350	12	1,344	2,000
PPI	3	538	-	1	150	-	5	750	400
NOAA HQ	1	112	120	3	336	300	2	224	1,000
OMAO	-	-	-	-	-	-	-	-	-
Total	**145**	**17,925**	**27,937**	**36**	**4,626**	**18,730**	**168**	**22,812**	**35,320**

* For a detailed breakout of this information, see Appendix A. All funding figures are in thousands of dollars.
Staff Includes both federal and contract staff.

Advancing social science at NOAA in the current budget climate will necessarily be an iterative process. There are additional needs identified in Appendix B as well as detailed information on the requirements for a fully operational social science structure at NOAA, however, we have presented here the most critical needs and requirements to meet our legal mandates and most effectively achieve our mission. It should be noted that this assessment is not intended to be a budget exercise, but rather to provide a list of priority gaps that need to be filled through strategic planning and budgeting processes. It is also important to note that this assessment was based

largely on FY11 funding and staffing levels, and budgets have declined sharply since then, in some cases significantly increasing existing gaps.

Current Capability

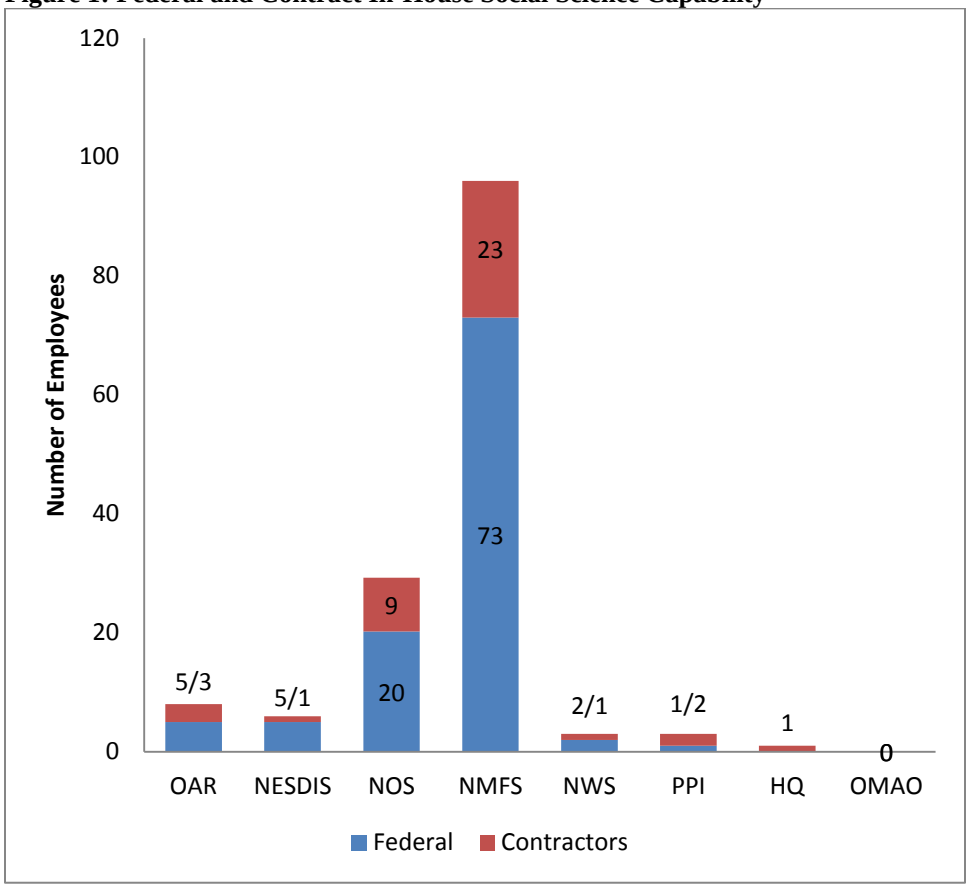
To provide a more complete picture of social science capacity at NOAA, we worked with the social science leads of each line office to document Federal employees and contractors who actively participate in social science activities.

In-House Capacity. For the purposes of this assessment, we define in-house capacity as federal employees or contract staff who conduct or support social science research, provide social science data, provide or maintain social science tools, or provide social science technical assistance (whether or not they are in social science job series). The data in Figure 9 (below) were compiled from the workforce management data and the respective knowledge of the Social Science Committee. This is a more accurate picture of in-house social science capacity than that provided in Figure 1.2 (Federal Employees in Social Science Job Series) for three reasons: 1) it includes federal employees who are not in social science job series that participate in social science research and activities, 2) it includes contract staff, and 3) it does not include federal employees in social science job series who do not participate in social science research and activities.

As can be seen in Figure 1, the majority (66 percent) of NOAA's in-house social science capacity resides in NMFS, with 96 employees. Of these 23 employees (24 percent) are contract staff. Twenty percent (29 employees) reside in NOS, with nine of those employees (31 percent) being contract staff. OAR, NWS, NESDIS, PPI and NOAA Headquarters, each have less than five percent of NOAA's social science in-house capacity. OMAO does not have social science capacity, but utilizes the capacity in the LOs when needed.

For additional information on NOAA's federal social science workforce, see Appendix C.

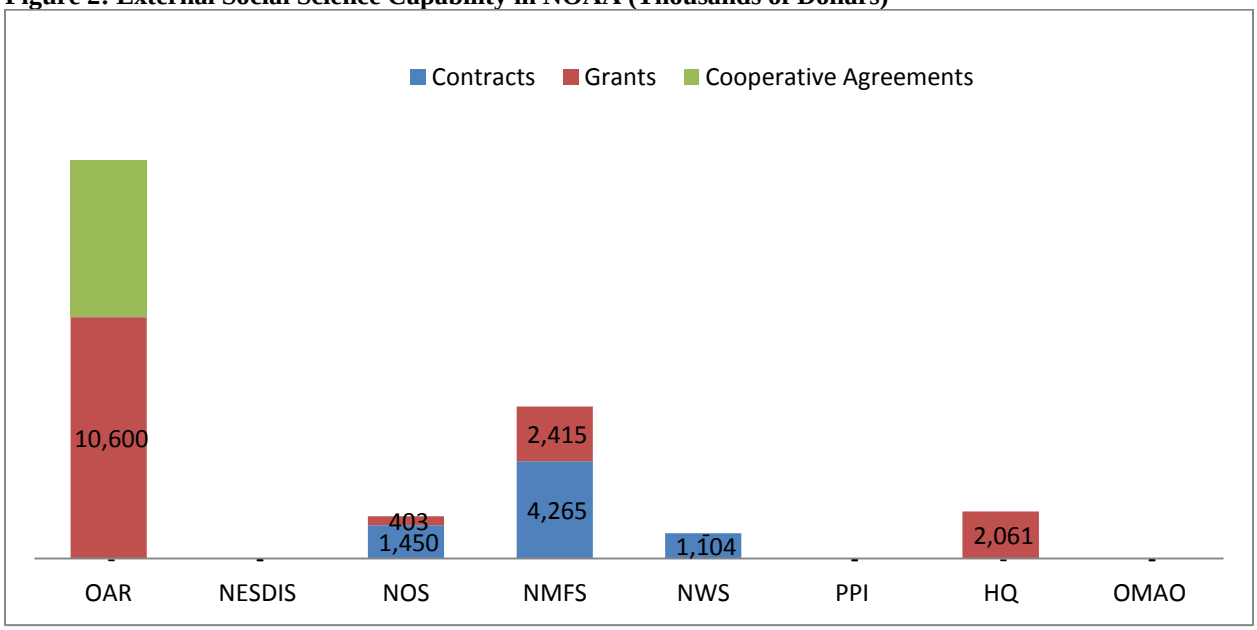
Figure 1: Federal and Contract In-House Social Science Capability



External Capability. The discussion above concerned NOAA's social science capacity that exists in the form of employees. Another significant source of its capacity is accessed through contracts, grants, and cooperative agreements. There has been significant discussion over the years on what the appropriate mix between in-house and external should be. Certainly not all of NOAA's social science work need be done by in-house employees, however it may be true that contracting out social science is not the most efficient or effective way of conducting that work. One reason is that, when work is contracted out or conducted through grants, there is no institutional memory related to what was done or how the work was used. In any case, the information contained in Figure 2 (below) is a snapshot of what NOAA's external social science capacity looked like in FY11.

As can be seen in Figure 2, most of the external social science funding resides in OAR, with over $17 million (60 percent). NOAA Fisheries funds approximately $6.6 million (23 percent) in external social science of which about two-thirds is contracts and one-third is grants. Following these offices, about seven percent of external social science funds is in NOAA headquarters, six percent in NOS, and four percent in NWS. For detailed discussion of these amounts, please see the individual LO sections in Appendix B.

Figure 2: External Social Science Capability in NOAA (Thousands of Dollars)[8]



Social Science IDIQ. One example of external social science expertise in NOAA is the Indefinite Delivery, Indefinite Quantity (IDIQ) Social Science contract in NOAA's Coastal Services Center. This open-ended contracting vehicle provides a fast and easy way for federal government entities to acquire social science services from the private sector. The products developed through this contract must be used to support local, regional, and national coastal management efforts. Two contractors, Eastern Research Group, Inc., and Booz Allen Hamilton, Inc., were competitively selected for this multiple-award, five-year vehicle. Task orders are placed under the contract, and the two contractors compete for individual task awards. Services provided under the contract include analyses such as demographic, market economic, and social network analyses; assessments such as needs and social assessments, and evaluation; and tools and methods such as focus group design and implementation, nonmarket valuation, risk communication, and community-based social marketing. Examples of work performed through this IDIQ include:

- *Fisheries Socio-Economic Monitoring Instrument Design*. Developed two fisheries surveys for the Northeast region, one with permit holders and vessel captains, and a second with vessel crew. (NMFS)
- *Hurricane Forecast Improvement Program Socio-Economic Research and Recommendations*. Assessed user needs for wind information, including the types of information, format, and delivery by audience type and provided recommendations from the research on communicating tropical cyclone hazard predictions and how this affects segments of the at-risk populations by testing developed products. (NWS)
- *Adapting to Rising Tides*. Provided process design, coordination, and meeting development support for the project, provided economic analyses for asset vulnerability, and recommended next steps for roll-out of the project's products to communities. (NOS)

[8] The grant amount for OAR includes cooperative agreements.

Cooperative Institutes. The vehicles described above are those through which the majority of external social science work takes place, however there are other vehicles that are used now and have significant potential for future use. One of these is Cooperative Institutes (CI). Currently, the use of cooperative institutes is not widespread in terms of social science work. However, there are several examples of the use of CI's for social science, notably in OAR where CI's are used in support of the Regional Integrated Sciences and Assessments (RISA) centers. But it remains true that NOAA can benefit significantly from vehicles other than in-house capacity, contracts and grants.

Partnerships and Inter-agency Relationships. Another area which is critical for NOAA to make progress in meeting its social science needs is partnerships with states, local governments, Non-Governmental Organizations (NGOs), industry; and with other federal agencies with common aspects of our respective missions. To use taxpayer dollars in the most efficient way, and particularly in the current budget environment, joining forces to achieve a common objective, or coordinating a common need for data, tools or allows NOAA to accomplish much more than the agency could on its own. Additionally, a close working relationship with our partners will provide insights into the broader context in which we work, allowing NOAA to be more productive and effective. NOAA has many partnerships and inter-agency relationships related to social science and they vary significantly by LO. These are identified and discussed in detail in Appendix B.

Social Science Disciplines. NOAA's efforts to understand the broad social and economic implications of the agency's impact and mission cannot be accomplished without a broad range of social science disciplines. Historically, NOAA, through specific language in legal mandates, has focused its social science capacity on estimating the economic impacts of environmental resource damages and on understanding the economic implications of fishery regulations. As NOAA's culture has evolved to the point where there is recognition of the need for a more well-rounded understanding of the wider social implications of NOAA's mission, the agency has made progress in increasing the diversity of social science disciplines it utilizes. There is still a great need for economic analysis, data, tools and technical assistance, but in order for these elements to be meaningful, they need to be viewed in the context of society, our culture, our behavior, and our values.

Each of the LOs has a need for different mix of social science disciplines, but all of NOAA needs to ensure that the economic and social implications of their missions are addressed and needs to understand the societal impacts, including the value of products, services and activities.

Conclusions and Recommendations

While substantial and growing, NOAA's social science capacity is generally insufficient to meet the needs of the agency. Social science at the agency is inconsistently applied across the line offices and not well integrated into NOAA's mission in the broad sense; it is limited in our research and operations and almost entirely lacking in our decision making. If NOAA hopes to meet the societal challenges of the 21st century, it cannot continue to operate with a social science capacity that barely meets the needs of the 20th century. That means NOAA must

increase the resources it devoted to social science, both internally and externally, and improve the integration of social science into all of NOAA service, science, and stewardship activities.

The gaps in social science at NOAA also include a lack of integration of social science with NOAA's natural sciences and engineering and a lack of coordination of social science across the agency. NOAA's existing social science power is embedded deep within the LOs and programs and currently is not well-harnessed at a corporate level. In order to resolve these issues, the agency needs to address the gaps contained herein, but also must examine its social science enterprise from a holistic "One NOAA" viewpoint in order to understand how the various social science functions fit together (See Figure 11), and the ways in which NOAA affects society. This must be done at both the LO level and at a NOAA-wide, corporate level.

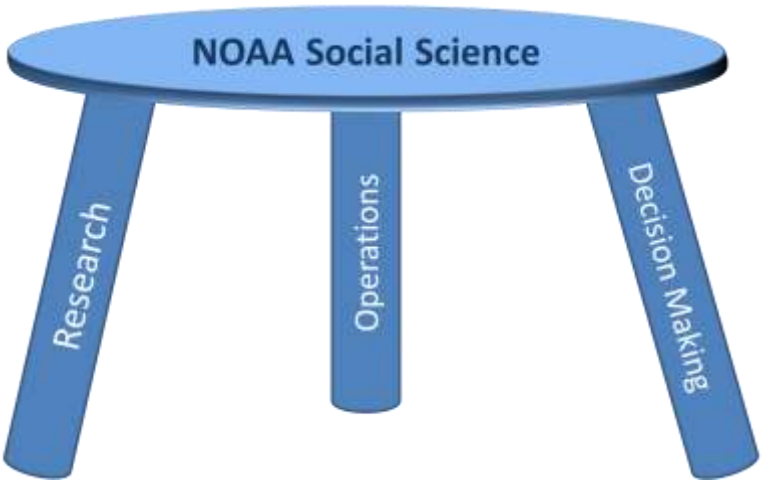


Figure 3. NOAA's Social Science Functions

While social science at NOAA had its start in the very specific application of social science methods to address legal mandates, the social science expertise now needed by the Agency are not necessarily unique to any particular NOAA function. Social science techniques and expertise within one line office or program could easily be transferred to others. NOAA must make best use of the social science capacity distributed throughout the agency. This will take strong leadership in the social science realm. The ad hoc nature of social science leadership at NOAA must become permanent, strong, and be capable of consistently guiding coordinated and integrated social science research, application, and communication.

This assessment was conducted to fulfill a request of the Science Advisory Board, but it does not end there. NOAA leadership needs to take concrete steps to address the gaps in social science identified by this assessment. These gaps are well-known and have been the subject of previous SAB reviews. Each line office, indeed corporate and headquarters level programs, will find different ways of filling these gaps. In some cases, gaps should be filled with new hires. In other cases, gaps may be filled by transitioning positions from non-social science to social science or by allowing the many social scientists now in non-social science job descriptions to apply their social science training to decision-making at the agency. Some gaps will be filled by improving the coordination of social science within and across line offices. Other gaps will be

filled by hiring senior level social scientists (e.g. SL or ST) to guide social science research and application at NOAA, the Sea Grant College Program, the Cooperative Institutes, and with other external partners. In some situations, gaps in social science can be filled by offering social science training workshops to those scientists engaged in providing products for known general public uses so that they may contribute social science feedback on their products/forecasts.

In addition to concrete steps to fill the human gaps in NOAA's social science capacity, NOAA should regularly assess whether its social science capacity is sufficient to meet its mission goals. To accomplish these goals of immediate and sustainable improvement in NOAA's social science capacity, NOAA should commit to a process in which it can utilize the information contained in this assessment to build an effective social science capacity that will be sufficient to meet NOAA's needs. This will involve the social science community working with leadership and the programs to ensure that the social science capacity is adequate to meet the requirements of NOAA's mission.

The need for social science will always exist at NOAA and meeting that need will be an ongoing endeavor. This assessment is a first step on the path to improving the agencies effectiveness at meeting societal needs by better social science research and application. Here we propose concrete steps to begin this journey - recommendations that will maintain the current momentum for better social science in service of the agency.

Recommendations: Social Science for a Better NOAA

The major recommendations are as follows:

- *Repurpose the Research Council Social Science Committee to be the NOAA Social Science Committee that will strategically advance, coordinate, and guide NOAA's social science research, operations, and decision making.* This committee would subsume the functions of the existing NOAA Research Council Social Science Committee and would be expanded to include staff knowledgeable about how social science capability is incorporated into operations and decision-making, and that have the ability to identify and leverage opportunities for social science in NOAA day-to-day functions. It would have a dual reporting role to the Chief Economist and to the Research Council.

  The critical aspect of this Committee is an ability to understand how social science capability is incorporated into operations and decision-making and to identify and leverage opportunities for social science in NOAA day-to-day functions. Many of NOAA's social science needs are not research oriented, but involve the regular application of social science to decision-making at NOAA, its partners, and its constituents. Having both research and operations and decision-making expertise on the social science committee will allow it to make strategic recommendations on how to best utilize social science in NOAA's research, operations and decision making.

Many of NOAA's social science needs are not research oriented, but involve the regular application of social science to decision-making at NOAA...

- *A Process for Moving Forward.* The first order of business for the NOAA Social Science Committee should be to develop a concrete plan to fill the gaps outlined in this report, to develop a concrete strategy and criteria for the evaluation of gaps, and begin to implement a plan for the following:

  - *Fill Critical Gaps.* Many of the gaps identified put NOAA at risk of not fulfilling its legal mandates and reduce our ability to meet our science, service, and stewardship responsibilities. Strategies should be identified through the SEE and budget processes to fill those gaps as quickly as is feasible, and should be considered for inclusion in a future budget request. In addition, budget neutral options such as integrating efforts across lines to reduce costs, or leveraging or repurposing existing funding and/or grant programs and staff should be considered. For instance an interim alternative may be to fund social, behavioral, and economic (SBE) science studies through the various Cooperative Institutes, and Sea Grant programs.

- *Periodic Social Science Needs Assessments.* Now that NOAA has been through the process of compiling the information necessary to understand the agency's current social science capacity, needs, and gaps, it will be easier in the future to collect the same information. This will help NOAA determine its status in meeting its social science needs and the trend it is following regarding social science capacity, using this assessment as a baseline. A periodic assessment will be critical to ensuring that NOAA meets its social science needs. The NOAA Social Science Committee should conduct the assessment every two years. Deep dive assessments for critical NOAA offices and programs should also be prioritized and executed.

NOAA, Society, and the Economy:

An Assessment of NOAA'S
Social Science Capability and Needs

APPENDIX

July 18, 2013
Silver Spring, MD

Contributing Authors:
Peter C. Wiley
Linwood Pendleton
Tracy Rouleau
Brent Ache
Nancy Beller-Simms
Rita Curtis
Cecile Daniels
John Gaynor
Charlie Morris
Toni Parham
Avery Sen
Jennifer Sprague
Ariana Sutton-Grier

Introduction

This volume contains the appendices to the NOAA Social Science Needs Assessment. These include the following.

Appendix A: Description of Gaps. This is a succinct statement and description of NOAA's current social science capacity and gaps. Appendix A includes three tables providing information on current capability, gaps covering immediate risks, and gaps to make social science fully operational. This information is provided for Staff, Staff Funding, and External Funding. A description of what is included in each of these estimates is also provided.

Appendix B: Social Science in the NOAA Line Offices is a detailed description, by Line Office, of NOAA social science capacity, needs and gaps. Each LO section includes:

- a description of mandates for social science;
- a quantification of current social science capacity; and
- a statement of need expressed:
    - to cover immediate risks, and
    - in terms of making NOAA social science fully operational.

Appendix C: NOAA's Federal Social Science Workforce.
NOAA's social science capacity resides in its federal employees and contractors, as well as its partners in the public and private sectors. Unfortunately, a centralized source of information exists only for NOAA's federal workforce. This Appendix provides a breakdown of the federal workforce, including a set of descriptive figures.

Appendix A. Description of Gaps

Table A1. Staffing Summary (Full Time Equivalents)

	Current Capability		Gaps			
			Covering Immediate Risks		Fully Operational	
	Federal	Contract	Federal	Contract	Federal	Contract
OAR	5	3	-	2	16	5
NOS	20	9	10	4	30	12
NMFS	73	23	10	-	47	9
NWS	2	1	1	-	30	-
NESDIS	5	1	3	2	4	8
PPI	1	2	1		5	-
NOAA HQ	-	1	1	2	1	1
OMAO	-	-	-	-	-	-

Table A2. Staffing Funding Summary ($000)

	Current Capability		Gaps			
			Covering Immediate Risks		Fully Operational	
	Federal	Contract	Federal	Contract	Federal	Contract
OAR	750	375	-	300	2,400	750
NOS	2,268	952	1,120	448	3,360	1,344
NMFS	10,800	1,100	1,600	-	7,680	1,600
NWS	224	112	112	-	3,360	-
NESDIS	543	151	336	224	470	874
PPI	150	387.50	150	-	750	
NOAA HQ	-	112	112	224	112	112
OMAO	-	-	-	-	-	-

Table A3. External Funding Summary ($000)

	Current Capability			Covering Immediate Risks			Fully Operational		
	Contract	Grant	Cooperative Agreements	Contract	Grant	Cooperative Agreements	Contract	Grant	Cooperative Agreements
OAR	-	10,600	6,880	-	3,100	5,150	-	17,280	-
NOS	1,450	403	-	2,900	-	-	5,960	-	-
NMFS	4,265	2,415	-	4,265	2,415	-	4,265	2,415	-
NWS	1,104	-	-	250	-	-	2,000	-	-
NESDIS	700	-	-	350	-	-	2,000	-	-
PPI	-	-	-	-	-	-	200	-	200
NOAA HQ	120	-	-	300	-	-	1,000	-	-
OMAO	-	-	-	-	-	-	-	-	-

Office of Oceanic and Atmospheric Research (OAR) (12/17)

Staffing:

Covering Immediate Risks: There has been an increased demand in recent months on CPO social scientists to participate in NOAA and interagency activities. This demand has put a strain on current capability, almost to the point of not meeting current expectations. Additional support was necessary for an AAAS fellow to work within the decision support realm, lending support to the Climate office as well as the National Climate Assessment. We also needed a social scientist trained in outreach activities to help articulate research findings to various web sources. Finally we needed an intern to help organize some of the research project findings and to write some background papers for use in presentations and on to communicate information on the web. Social scientists have participated in internal NOAA committees (e.g., Climate Engineering), as well as interagency activities through USGCRP, the NAS, etc.

Fully Operational: Note that this information was not in an FY11 CPO staffing plan as the Office was working on plans for a Climate Service. The CPO needs additional social scientists that have an interdisciplinary training to meet both current and expected future needs. Knowledge on sectoral issues (e.g., coasts, water, agriculture, health, etc.) and a basic scientific knowledge of climate science along with any experience with local decision making would be among the attributes needed in this office. In addition to the positions outlined in the section on "covering immediate risks" we would need an additional Federal position to work within the RISA program and two half-time FTEs to work in the SARP and COCA programs (or on related tasks) to meet the needs that are arising within each program.

Most lab and program directors indicated that they would like to see social scientists in their labs and programs, so with one per lab and program, excluding those already in CPO, totals 13. The exact distribution of social scientists in the labs and programs was not specified, but not all labs and programs indicated that they would want to house such a person or persons. We also estimate two social scientists in OAR HQ who will oversee and coordinate the social science activities in OAR and coordinate with the other LOs.

Funding

Covering immediate risks: Funds will have to be diverted to meet current needs. CPO assumed that FY12 is the budget reality. Numbers for OWAQ and CIs assume a decrease of about 15%.

Sea Grant projects are typically funded in two-year cycles, so comparing annual investments in social science is probably less useful than comparing the bienniums. FY2012-13 biennial Sea Grant social science investment more than doubled from the FY2010-11 investment. Sea Grant research projects are competitively awarded, so it's hard to estimate future awards, but the commitment to social science remains strong, and we anticipate similar levels of funding in the next biennium.

Fully operational: For CPO, an additional $3 million would be needed to fund the highest ranking 25% of proposals sent to SARP, COCA and RISA. Numbers for OWAQ, Sea Grant, and CIs assume an increase of about 100%.

Both the CI and Sea Grant offices noted that it is hard to develop an estimate of the social science investment that would maximize return on that investment (an "ideal" funding level). A larger investment would be well spent, particularly as more social scientists learn about and begin working with Sea Grant. For example, over the last two bienniums, the number of programs working with social scientists grew by 50%.

Disciplines

Covering immediate risks: CPO needs 1 decision specialist; .5 science/feature writer; .5 additional help (e.g., PMF, intern).

Most of the work Sea Grant does is highly integrated between natural and social sciences. A very rough estimate of how the social science funds are invested is as follows: thematically, 35% of social science work is in human dimensions of sustainable coastal development, 30% in socio-economics work in fisheries and aquaculture, 20% in integrated human and ecological systems, 10% in improving coastal resilience and climate adaptation/mitigation, and 5% in coastal literacy work.

Fully operational: In addition to the positions listed in budgetary realities, CPO would need two half-time (or 1 full) FTE with interdisciplinary training.

Needs for labs are less distinct, but could focus on two areas: improving communication of science and understanding behavior in response to new information. The former means we are looking at people's access to and comprehension of information, which implies communications science, cognitive psychology, knowledge management, possibly graphic design (admittedly a humanity, not a social science). The latter means we are looking at people's actions, choices, and lifestyles, which implies decision science, economics, ethnographic anthropology, possibly marketing.

The disciplines needed for OAR HQ center on public policy and public administration, program evaluation, management science, and organizational theory, possibly cybernetics.

National Ocean Service (NOS)

Staffing:

- *Covering immediate risks*: Sanctuary social science coordinators, economists for regional branches in OR&R, risk behavior and behavior change expertise for coastal management, social science expertise for engagement on social science issues in coastal communities, and economist to understand the societal benefits of coastal and ocean research, a social science specialist to address coastal management issues.
- *Fully operational*: Sanctuary social science coordinators, economists for regional branches in OR&R, staff for coastal social science hub (economists, social science specialists, social psychologist), risk behavior and behavior change expertise for coastal management, social science expertise for engagement on social science issues in coastal communities, and economist to understand the societal benefits of coastal and ocean research, human geographers, a political scientist, a program evaluation specialist

Funding

- *Covering immediate risks*: To fund staff and contract funds to cover risk behavior studies, non-market studies on resiliency and hazards, a marine transportation economic study, engagement with coastal communities on social science information needs, social science of coastal and ocean science research, coastal research on stakeholder needs, community values, economic development and resource protection, and socioeconomic issues related to corals; the economic value of hydrographic surveys and nautical charts, and the value of geodetic products.
- *Fully operational*: To fund staff and contract funds to cover sanctuary social science tool development, economic value of real-time physical oceanographic information, and user data for physical oceanographic products, a social science hub for coastal management providing socioeconomic research, data, tools and technical assistance, social science of coastal and ocean science research, coastal research on stakeholder needs, community values, economic development and resource protection, and socioeconomic issues related to corals; research on navigation behavior to develop better navigation products, and methods development research (valuation and cross disciplinary) and ecosystem service valuation research.

Disciplines

- *Covering immediate risks:* 10 economists, 1 risk behavior communications specialist, 1 social psychologist, 2 social science specialist

- *Fully operational:* 27 economists, 9 social science specialists, 1 risk behavior communications specialist, 1 social psychologist, 2 human geographers, 1 political scientist, 1 program evaluation specialist

NOAA Fisheries Services

Staffing:

- *Covering immediate risks*: 10 FTEs, including 3 recreational fisheries economists in the Northeast, Southeast, and Pacific Islands; 3 spatial econometricians for assessing marine spatial management / spatial permitting/zoning options in the Northeast, Southeast, and Pacific Islands; 1 commercial fisheries economist to support the Pacific Groundfish Trawl Rationalization Program in the Northwest; 1 bioeconomic modeler to support development of the California Current Integrated Ecosystem Assessment; and two social scientists, one in Alaska to conduct National Standard 8 and NEPA social impact assessments and one in Headquarters to support national policy issues and coordinate regional research and assessments.
- *Fully operational*: 48 FTEs including 10 FTEs cited above. These positions include a mix of management and research positions and, with the exception of 4 FTEs, would be stationed at the regional NMFS Science Centers and Regional Offices. Positions include the capabilities cited above (spatial modelers, commercial fishing/catch share program research and assessments, recreational fisheries economists, and social scientists) as well additional staff to support mandated economic analyses by NEPA, MSA, E.O. 12866, and Environmental Justice.

Funding

- *Covering immediate risks*: Restore $3.3M in funding that was cut from the Program in FY12. Funding will support 10 FTEs cited above as well as to support further development and deployment of three decision support tools that will enable the Agency to work "smarter", i.e., more cost-effectively, while improving the overall quality of information provided to fishery managers and other decision makers. Decision support tools include: FishSET, a spatial modeling tool for assessing trade-offs of marine spatial management strategies in a risk framework; BLAST, a dynamic, bioeconomic recreational fisheries modeling tool for use in management; and a Social Indicators Toolbox that includes metrics for assessing community resiliency and community vulnerability.
- *Fully operational*: An additional $14.7M, including the $3.3M cited above, is required to bring the Program to its 100% requirement. This includes $7.**7**M for 48 required FTEs; $1.7M for development and deployment of decision support tools cited above; $2.7M for a mix of contract capabilities including human geographer, demographer; 3 economists with expertise in risk assessment, disaster assessment, and markets; 5 social scientists with expertise in environmental justice and NEPA; and 22 contractors that conduct field work, compile data, and support other research and assessment functions. The remaining $**2.6**M will fill key gaps in core commercial and recreational fisheries data collection programs as well as data and research supporting protected species, habitat and ecosystem services assessments.

Disciplines

- *Covering immediate risks:* 8 economists, 2 social scientists
- *Fully operational:* 29 economists, 13 social scientists, 3 demographers, 3 human geographers

National Weather Service (NWS)

Staffing:

- *Covering immediate risks*: Hire an economist to conduct economic valuation projects relating to NWS products and services. The economist would work in collaboration with the existing social science focal point/coordinator and the risk communication specialist in developing the social science coordinating structure.
- *Fully operational*: NWS headquarters social science focal point/coordinator (coordinating role), a risk behavior/risk communication specialist, a social psychologist for behavior change expertise, a decision theory specialist, a cognitive psychologist and an economist to supervise the collection of data on the economic impacts of weather events and to conduct economic valuation studies. NWS Regions and certain NWS National Centers: a risk behavior/risk communication specialist and an economist to conduct locally based economic valuation studies and damage assessments.

Funding

- *Covering immediate risks*: Maintain current funding of the four, two year social science projects with OAR.
- *Fully operational*: "Coordinate and track a specific budget element[1] to address communication of risk and forecast confidence in its products and services for better decision-making; comprehensive understanding of how its Core Partners and the public perceive and use data and services; develop performance measurements relating to societal outcomes/impacts and decision tools; evaluate and articulate the value and effectiveness of NWS' products and services; develop operational processes that include the integration of social science into new skill sets, development of communication and decision support tools before they are operational; development of format and presentation considerations of probabilistic/confidence information for customers; incorporate societal impacts into the forecast process; development of forecaster training and increased educational requirements in social sciences.

Disciplines

- *Covering immediate risks:* 3 FTE social science hires: 1 social science focal point/coordinator (existing), 1 risk behavior communications specialist (existing), 1 economist

- *Fully operational:* 30 FTE social science hires:
    - 6 at NWS Headquarters: 1 social science focal point/coordinator (coordinating role), 1 risk behavior/risk communication specialist, 1 social psychologist for behavior change expertise, 1 decision theory specialist, 1 cognitive psychologist and 1 economist.

[1] Within the current plans to restructure the NWS budget, the budget element would likely fall within one or more of the newly structured PPAs.

- 12 within the six NWS Regions: 1 risk behavior/risk communication specialist and 1 economist to conduct locally based economic valuation studies and damage assessments.
- 12 within and among the NWS National Centers: 1 risk behavior/risk communication specialist and 1 economist to help with the integration of social science within the Centers

National Environmental Satellite Data and Information Service (NESDIS)

Staffing:

- *Covering immediate risks*: With current focus on addressing the satellite data gaps due to the production challenges for the GOES and POES next generation satellites, the opportunities to find funding to support social science perspectives will be lower on the priority list
- *Fully operational*: The incorporation of economists and social scientist to help connect the dollars to the people will be important to support the needs of these satellite and instruments as the cost increase due to time and materials. Providing a comprehensive perspective of the importance of environmental satellites are to our society, in addition to the dollars and lives saved because of increased forecasting becomes more and more important to the successes of the programs. There are many researchers and external organizations that utilize data from the satellites to provide services, and those stories also need to be included in justifications for the future.

Funding

- *Covering immediate risks*: With current focus on addressing the satellite data gaps due to the production challenges for the GOES and POES next generation satellites, the opportunities to find funding to support social science perspectives will be lower on the priority list

- *Fully operational*: To fund staff and contract funds to cover economic value data from satellite downloads, social science of climate and environmental issues, stakeholder needs, community values, economic development and resource protection, and socioeconomic issues.

Disciplines

- *Covering immediate risks:* 3 economists and 2 social science specialist

- *Fully operational:* 6 regional climate service directors, 3 specialists in the economic benefits of environmental satellites, and 3 specialists in societal impacts of climate change topics such as drought sea level rise and extreme weather trends.

Office of Program Planning and Integration (PPI)

Staffing:

- Covering immediate risks: Chief Economist (currently an IPA); two deputies including one Sr. Social Science Advisor and one Sr. Social Scientist on contract; one staff level social scientist.
- Fully operational: Obtain an SL position for the Chief Economist, convert the Sr. Social Scientist contract to permanent FTE Sr. Social Science Advisor, add one additional permanent social scientist staff.

Funding

- Covering immediate risks: PPI has increased staff and funding to improve its ability to develop and implement an innovative, NOAA-wide economic and social science research agenda that advances the Departments goals.
- Fully operational: To fund permanent staff as described in the ideal staffing scenario, and provide modest contract funds to support NOAA's most pressing valuation and social science needs.

Disciplines

- Covering immediate risks: Chief Economist with an advanced degree in Economics, environmental economics or a similar discipline, PPI's senior social scientist advisors, and staff can have broader social science, or interdisciplinary backgrounds.
- Fully operational: Chief Economist with an advanced degree in Economics, environmental economics or a similar discipline, PPI's senior social scientist advisors, and staff can have broader social science, or interdisciplinary backgrounds.

NOAA Headquarters

Staffing:

- *Covering immediate risks*: Communication specialty, particularly for risk assessment and risk communication, Social Science for additional education assessments, Economic expertise to conduct economic assessment of NOAA's products and services,
- *Fully operational*: In addition to the above, Economics for economic valuation (value of NOAA to the Nation) and Social scientist to evaluate NOAA user behaviors,

Funding

- *Covering immediate risks*: To fund staff and contract funds to cover risk assessment and risk communication, educational assessments, and economic assessments of NOAA's products and services
- *Fully operational*: To fund staff and contract funds to cover the above plus additional economic valuation studies (design, implementation, and analysis) as well as studies about NOAA's user behavior

Disciplines

- *Covering immediate risks:* 1 full-time Social scientist with expertise in risk evaluation and communication, Part-time Additional Social scientist for education research, 1 full-time Economist for economic assessment of NOAA's goods and services

- *Fully operational:* Additional 1 full-time Economist with expertise for economic valuation studies and/or Social Scientist to study NOAA product user behaviors

Office of Marine and Aviation Operations (OMAO)

No needs identified.

Appendix B.

Social Science in the NOAA Line Offices

Note: Because each LO is very different in its use of social science research and information, the line office summaries vary in terms of how the information is organized. However, there is information common to each line office which were used to develop comparative information on capability, needs and gaps.

Office of Oceanic and Atmospheric Research (OAR)

Social Science in OAR

Social science is needed to directly support research itself, e.g., to set priorities for research and to develop decision support interfaces, and it is also needed to support the NOAA services. One cannot advance from the program outputs to the program outcomes in the various logic models in the implementation plan without the application of social science. In addition, the use of social science allows a bridging function between science and users, allowing NOAA scientists to better understand what users need and also providing decision and policy makers a way to articulate their needs for new and improved science products. The activities of OAR can be divided into the following:

1. Development of decision support tools
   To develop useful decision support systems requires knowledge of how the users of such systems receive and use the information. Communication, cognition, decision science, behavioral psychology (including behavioral economics and decision-making), public policy, risk analysis, and cultural geographical disciplines in social science are needed in this development.

2. Development of new or improved environmental forecasts
   Simply developing a new or improved forecast does not mean that it will improve decision-making. Socioeconomic and value of information assessments should be completed before research and development begins to determine the benefit/cost (monetary and non-monetary) of such improvements or new products.

3. Improving resilience to environmental extremes and perception of uncertainty
   Usually the first step to address resilience, such as resilient coastal communities, is to assess public risk perception. An additional component of education may be required if the perception of risk is not aligned with the actual risk. Critical components of resilience are adaptation and/or mitigation. Through modeling, OAR research supports much of the climate assessment activity performed in NOAA. Evaluation of coastal and ocean resources at risk is a critical step in this decision process. Also involved is the cognitive understanding of uncertainty so that appropriate decisions are made.

4. Understanding the relationship between the environment and human health
   Much research and development is being done in OAR related to forecasting the environmental stressors on human health from short-term forecasts of air quality to long-term climate outlooks of potential viral outbreaks. The public understanding of these sometimes complex and less obvious relationships requires medical experts, communication, and cognition expertise for appropriate public response.

5. Valuing OAR's research and development
   There are two aspects to valuing OAR's research. One is to determine its socioeconomic value in the context of how stakeholders benefit as they rely on research and services for managing risk and identifying adaptation strategies. Is this research contributing effectively to information systems that support cost effective management, operations

and practices under a continually changing environment? Are public funds being well spent on this research? The other reason to determine a socioeconomic value to OAR's research is to help with decisions on planning and priorities within NOAA as well as to other Federal agencies. Both needs require estimates of the potential value of new or improved products and services that will be created. Here, we include the development of new observing systems as well as the adoption of existing observing systems for new uses.

Several laboratories and programs also mentioned the need to integrate social science research with the transition of research and development to applications in which all are involved at varying levels. Social science is needed to maximize the success of most transitions. Many OAR laboratories and programs are involved with test beds of various types and these are convenient facilities for such integration. This integration with research-to-applications can be accomplished with the in-house social scientists located within the laboratories and programs or with social scientists associated with each test bed who may be supported on the operations side of NOAA in many cases.

Mission Mandates and Drivers that Require Investment in Social Science

Legal Mandates

OAR does not have drivers that legally mandate social science. However, many of the legal mandates that drive research and development in OAR require the application of social science to satisfy their requirements. Among them are:

`America Competes Act of 2007

- Clean Water Act Amendments (CWAA) of 1990
- Coastal Zone Management Act (CZMA)
- Coastal Zone Enhancement Grants (Section 309)
- Endangered Species Act (ESA)
- Global Change Research Act of 1990, 15 U.S.C. § 2921 et seq
- Harmful Algal Bloom & Hypoxia Research & Control Act (HABHRCA)
- Inland Flood Forecasting and Warning System Act of 2002
- Integrated Coastal and Ocean Observation System Act of 2009
- Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 et seq.
- Marine Debris Research Prevention and Reduction Act (MDRPRA)
- NISA National Invasive Species Act (NISA)
- National Climate Program Act of 1978, 15 U.S.C. § 2901 et seq.
- National Integrated Drought Information System Act of 2006, H.R.5136 et seq. (NIDIS)
- National Marine Sanctuaries Act (NMSA)
- National Ocean Policy (NOP)
- National Sea Grant College Program (NSGCP) Amendments Act of 2008
- Ocean Exploration and Research Acts (OERA)

- Ocean Research Priorities Plan and Implementation Strategy
- Oceans & Human Health Act (OHH)
- Oil Pollution Act (OPA)
- Secure Water Act of 2009
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Integrated Ocean Observing System (IOOS) Act

Most of these mandates are for research or services and require economic and risk assessments as well as research to optimize public and other sector understanding of the information resulting from these mandates. As mentioned above, meeting each of the goals and objectives in the Next Generation Strategic Plan (NGSP) requires the application of social science.

FY2011 Social Science Capability

In-house capability

Within OAR, social scientists are largely concentrated in the Climate Program Office. Most of the Climate Program Office's Climate and Societal Interactions' (CSI) professional staff (less than 10 FTEs) have interdisciplinary training/experience that include the social, natural, and/or physical sciences; they work on projects that merge these disciplines to direct a set of programs and provide policy and research leadership designed to promote "actionable science" relevant to managing a varying and changing climate. They provide in–house capability to analyze issues pertinent to NOAA in terms of climate including assessments of trends, impacts, and science designed to inform response strategies. CSI staff members also represent NOAA on major efforts such as the National Integrated Drought Information System (NIDIS), National Climate Assessment (NCA), Interagency Climate Change Adaptation Task Force (ICCATF), US Global Change Research Program (USGCRP), and the Intergovernmental Panel on Climate Change (IPCC). Other laboratories and programs in OAR do not have in-house social science capability.

External capability

There are three offices within OAR that currently have financial investment in the social sciences external to NOAA. They are the National Sea Grant College Program, the Office of Weather and Air Quality (OWAQ), and the Climate Program Office. For Sea Grant, the investment is in 28 of the 32 Sea Grant Colleges, totaling nearly two million dollars per year. The 2012-13 Sea Grant social science projects include research projects in economics (trade-off analysis, ecosystem service valuate, impact assessment, etc.; 41%), public awareness/perceptions (16%), market research (11%), spatial/geographical analyses (11%), sociology and anthropology (10%), legal analysis (8%), and program evaluation (4%).

The OWAQ invests approximately $480K per year, including an annual contribution of $200K from the National Weather Service. This funding supports external research in the U.S. and provides important social science capabilities to improve the communication and development of NOAA's weather products. Other social-science-related weather research is provided by the National Severe Storms Laboratory (NSSL), which invests about $50K annually.

The Climate Program Office's CSI Division supports external research in the U.S. and abroad that augments current understanding and practices used to meet the climate-related needs of decision makers. CSI research and capacity building activities address several societal challenges articulated in the context of the climate adaptation and mitigation objective of the NOAA NGSP), including: i) water resources; ii) coastal resilience; iii) marine ecosystems; and iv) climate and weather extreme events. In addition, several CSI programs support the Coping with Drought initiative of the National Integrated Drought Information System (NIDIS) by supporting science and policy experiments in regions threatened by drought. Many of these efforts span the physical, natural, and social sciences and apply tools and methodologies to use climate forecasts and information in enhanced and informed decision-making. Social Science represents approximately 40 percent of the total CSI budget (or about $9 million). CSI funds projects that make science more useful to society. In many cases, these are research projects framed by teams of social and physical/natural scientists together, which results in research that is highly integrative and applied.

NOAA's Cooperative Institutes provide an untapped capability for social science external to OAR. (See the section below.)

Partnerships

With the exception of the Climate Program Office, the partnerships that OAR maintains, aside from those derived from grants or the cooperative institutes, in social science are few and mostly fairly weak, not due to lack of need, but to both a historically stronger connection to earth system science and a lack of funding to support the partnerships. There has been some partnering with the National Science Foundation (NSF) through joint grants focused on the communication of hurricane information.

The Climate Program Office's CSI program has been a national leader for over two decades on climate impact and adaptation science. As a result, staff members are integral to a number of partnerships within and outside of the Federal Government that guide adaptation and mitigation efforts. As mentioned in the section on in-house capability, staff members are involved in international (e.g., IPCC), interagency (e.g., ICCATF and USGCRP), and national efforts that include more than Federal agencies, e.g., NIDIS and NCA. CSI is also involved with other interagency partnerships, such as the NOAA - National Science Foundation, Social, Behavioral, and Economic Directorate Interagency group that oversees connections between the RISAs and the Decision Making Under Uncertainty (DMUU) centers. A similar interagency group that meets on a periodic basis includes representatives from the Department of Interior's Climate Science Centers and the NOAA RISA program to discuss coordination of regional climate-related research activities. CSI is also involved in less formalized partnerships, such as the past two years of interactions between the NOAA SARP, EPA, and two water foundations (i.e., the WaterRF and the Water Environmental Research Foundation) focused on improving understanding and use of adaptation strategies and articulating information needs. Members of CSI also represent NOAA on relevant professional committees through organizations such as the American Meteorological Society. Staff also sponsors American Association for the Advancement of Sciences (AAAS) Science and Technology Policy fellows (scholars with Ph.D.s) and undergraduates through the NOAA Hollings Scholars Program to work at the

interface of science and policy. Finally, this group is instrumental in contributing towards other transboundary NOAA partnerships, such as the recent development of the NOAA-Western Governors Association's MOU.

Social Science Disciplines

Within the Climate Program Office, there are seven staff members with some education/training in the social sciences and/or interdisciplinary studies. Among the disciplinary expertise represented are Economics, Geography, Political Science, Decision Analysis, and International Relations.

As indicated above, the social science disciplines in the remaining sections of OAR have been entirely external. For Sea Grant, the disciplines are difficult to determine in total, since they reside within the 62 grants funded among the 28 programs. The same is true of the CPO external grants. There is little doubt that most of the social science disciplines listed in the NOAA's Science Advisory Board's 2009 Report, "Integrating Social Science into NOAA Planning, Evaluation and Decision Making" are represented among these grants.

For the small external investments of OWAQ and NSSL, the primary disciplines involved have been economics, geography, and anthropology. There is a need for more disciplines as mentioned in the section below on "Social Science Gaps".

Interagency Social Science

As mentioned in the section above on "Partnerships", OAR has worked with NSF on joint grants with joint funding, and also on planning projects with no exchange of funds in a less formalized arrangement. OAR (GLERL) has also worked informally with NASA's Data and Applications Center at Columbia University. Again, without funding or promise of funding, these arrangements remain informal and opportunistic and can be difficult to maintain.

As mentioned previously, CPO staff members are engaged in a number of interagency activities enumerated above. Examples of other interagency activities that would require some social science input include (a) subcommittees of the National Climate Assessment – such as those associated with Indicators, Coasts, Oceans, Urban areas, and Water; (b) subcommittees of the ICCATF such as the water subcommittee that recently completed a National Freshwater Action Plan; (c) the Climate Change and Western Water Group (CCAWG), and (d) the U.S. Global Change Research Program. This is not an exhaustive list, but a representative sample of the types of interagency endeavors staff members pursue.

Social Science Needs

Process, Products and Activities that Require Social Science

OAR provides the research that creates new or improved products and services. In addition, OAR provides and directly supports products and services in research or experimental models. The provision of environmental information, a major result of OAR's research, is also considered a service. The Climate Program Office programs use social science methodologies to better understand the users of climate information, as well as their needs, to determine how and why they use (or don't use) NOAA climate products, how decision makers could better incorporate climate information into their resource management routines, and how NOAA could better convey climate forecasts and information to decision makers. The expected outcomes include, and are not limited to: an increased understanding and application of NOAA's climate products by decision makers, augmented adaptation/coping capacity in the face of higher numbers and intensity of extreme events, expanded applications of climate information (e.g., with farmers and soil moisture indices), and increased abilities to combine climate information with other social and scientific models (e.g., combining climatological, hydrological, and economic models for reservoir operations) for improved resource management and resilience.

Social science research is also required to improve and create NOAA's weather and water products and services and to identify the value of weather information for U.S. commerce and economic growth. As part of a mission agency, OAR's research mission requires an understanding of the society and its behavior in the face of hazardous weather events, such as severe storms and flooding, to improve NOAA's products. This need for social science research to improve weather products has been articulated most recently during the national dialog meetings as part of the Weather Ready Nation initiative.

Social Science Gaps

Gaps based on immediate risks

As mentioned above, OAR supports research and development across a broad spectrum of the environmental sciences. For GLERL, the drivers for research and development are a set of legal mandates (see the "Legal Mandates" section above). For most of OAR, the drivers are strategic priorities such as, overall, the NGSP or the related Administrative Guidance Memorandum (AGM), and external reports, such as those written by the National Academy of Sciences. Most of these drivers require, or would be greatly improved, through appropriate integration of social science research or application to reach their goals. Yet, aside from the Climate Program Office, very little social science is supported by OAR. Therefore, the gaps are significant.

The list of needs in the section above is, for the most part, unmet. Distilling this list, we find specific gaps for all of OAR in:

- Optimum design of environmental decision support systems for optimum understanding and response;
- Societal sector and general public perception of risk for appropriate response for optimum community resiliency;
- Estimating and improving the value of new or improved products, services, and observing systems derived from research and development;

- Modeling and assessing the human dimensions of coastal and ocean natural resources.
- From a communication perspective, OAR's research would also benefit from social science that would provide
    - sufficient public understanding of the impacts of climate change and extreme events and the information available to support preparation, adaptation, management and/or response;
    - public understanding of the health impacts of poor air and water quality and the need to respond;
    - the need for specific information for planning as we understand impacts and requirements differ by sector and region/

Most of the needs identified above address the agency's ability to translate scientific information into usable and actionable results. Filling these gaps requires the expertise of a broad range of social scientists, including sociologists, human geographers, cultural anthropologists, economists, cognitive psychologists, and experts in communication theory.

Sea Grant currently has recently increased its funding for social science activity as mentioned in the "External Capability" section above. However, they do have a gap in in identifying and communicating social science research gaps and accomplishmentsinvolving social science, hence the need for at least one social scientist in their headquarters.
OWAQ has a current small investment in social science related to weather research, but it is not adequate to address the issues represented in the bullets above.

Within the Climate Program Office, activities have been started on extreme events and living marine resources, topics targeted within the NGSP. However, there are other key research areas related to impacts and responses that should also be started that would directly feed into what is necessary to meet the demands of decision makers or what is critical for adaptation and mitigation efforts such a better understanding of risk management, information systems, and scenario planning (e.g., the impact of climate on societal infrastructure such as the impact of heat waves on health and energy consumption). Given current budgetary realities, the work on extreme events and living marine resources will be at the expense of past and current efforts from this office.

The consensus of the other OAR laboratories and programs is that a granting and/or contracting activity, perhaps much of it with the cooperative institutes, is needed to fill their gaps in social science research and ensure that the Agency benefits from the finding. This would require the addition of a percentage of their total budgets in the range of two percent at minimum to be applied to external social science research and application. Excluding the current Sea Grant, OWAQ and CPO investments, this would amount to about a two million dollar additional annual investment in social science in OAR.

Fully Operational Social Science

OAR has at its disposal an impressive network of external partners and university affiliations that could provide a wealth of social science capacity. To utilize these external resources, however, requires more social science leadership at the highest levels of OAR.

Currently, the model for research is a passive one within OAR (excluding CPO) – external partners respond to relatively general RFPs and NOAA waits to see what innovative ideas rise to the top. A more active paradigm could be employed in which senior leadership could identify emerging research areas within the line office for which integrated social science methods are needed. A senior social scientist, perhaps at the SL or ST level, could provide such leadership. However, one challenge of having just *one* social scientist is that they are an island with no regular colleagues where as everyone else will have colleagues that speak a similar language of either physical and/or natural sciences. Though it is important to find people to speak multiple languages to successfully build a program, it would be more effective to have a couple of well-conceived concentrated efforts instead of a shot-gun approach to distributing social scientists. Such social scientists do not want to just be translators but to be viewed as equal in their research contributions as their other scientific colleagues.

The use of external capacity provides flexibility as social science needs and resources change over time and also will allow OAR to engage a broad set of social science. Adding approximately 2% of the laboratory or program total budgets may be adequate to support cooperative agreements or grants. In addition, at least one and perhaps up to five to seven, depending on the laboratory or program size, in-house social scientists in each lab and program are needed to work closely with the natural scientists and integrate social science with the natural sciences in the laboratory. The in-house social scientists will also be "receptors" and translators of the results from the external research.

The challenge is that OAR addresses such a broad range of environmental science that a corresponding broad range of in-house social science disciplines will be required. The in-house social scientists integrated among the laboratories and programs will need to coordinate and collaborate. At least one social scientist in OAR Headquarters will be needed to lead the coordination and facilitate the collaboration. In addition, this Headquarters social scientist will help coordinate with other NOAA Line Offices through the NOAA Social Science Committee and translate and brief social science issues, progress, and information to OAR Leadership. This individual will also work within NOAA's SEE process to ensure that OAR social science activities, accomplishments, milestones, issues, and gaps are included in the SEE documents such as the implementation plans and annual operating plans.

In addition to the cost estimate in the section above for external cooperative agreements or grants (the addition of about two percent of the OAR laboratory and program budgets) and excluding the social scientists directly connected with NOAA test beds which may be support by the operations side of NOAA, the additional in-house social scientists proposed in an ideal structure would be the order of 20 at a cost of about four million dollars. These would be distributed among the labs where there is need and at OAR headquarters.

Within CPO, partnerships and capabilities have already been established though new ones are always being made, and coordination is already strong between the CPO office, the academic community, the Federal science and policy arenas, and other partners. The Climate Program Office is faced with a public that understands that climate has and will continue to become an increasingly more important factor in resource management decision-making. Given the uncertainties they face, they are turning more often and in larger numbers to NOAA to understand and apply climate forecasts and information to plan for their futures.
In an ideal world with no budget constraints, additional internal staff members would be needed to oversee the development of new tools, methodologies and activities to help national, state, local and tribal governments and resource managers prepare for, adapt and respond to drought and flooding to more confidently manage water resources; to work with coastal resource managers to incorporate a greater understanding of the risks of sea level rise, changes in Great Lakes hydrology and water levels and other climate impacts to reduce the vulnerability of coastal communities and ecosystems; to work with living marine resource managers to prepare for and respond to ocean acidification and other climate impacts; to aid decision makers as they prepare for and adapt to climate extremes including deviations in temperatures and precipitation patterns; and to provide policy makers with the information and understanding they need to implement and manage options by limiting climate change and its impacts.

Implications for future budget implications for Social Science within OAR

FY12 reductions overall were substantial in OAR and the impact on social science was meaningful. Among the impacts felt were:

- At the end of the current award, OWAQ stopped funding the Societal Impacts Program at NCAR in FY2012. To help foster collaboration in social science important to both lines, and to mitigate budget cuts, OAR partnered with NWS to fund four projects selected in an external competition in FY2012 that focused on social science supporting severe weather information, forecasts and warnings.
- Within CPO, a number of actions affected social science capacity: The proposal to create a NOAA Climate Service was not approved. During this year, the International Research Institute for Climate and Society (IRI), which was created by NOAA in the mid-1990's and until this year has received several million dollars per year, was not funded. Research funded through the IRI has traditionally encapsulated the physical, natural and social sciences. Finally, the entire office was cut an additional five percent. CSI programs experienced reductions, affecting research dollars available to social scientists.

The one bright spot for FY2012 is that Sea Grant doubled its annual investment in social science grants to nearly four million dollars. OAR will increase its effort to link the emerging social science research in the Sea Grant Program to NOAA's strategic requirements as much as possible to take full advantage of this investment. Sea Grant identified social science as a high programmatic priority and committed substantial resources to expand its role in integrated natural and human dimensions research.

For FY13 and beyond, the small investment by NSSL in the University of Oklahoma cooperative institute continued through FY2012, but future-year investments are uncertain.

Within CPO, future budget reductions will result in a noticeable cut in research that would develop new tools, methodologies, partnerships, and knowledge. It will also diminish opportunities for collaboration. This comes at a time when new scientific discoveries and adaptation planning are creating increased demand for the activities traditionally started, nurtured, funded, and shared by NOAA.

In general, although recent studies with decision makers outline their need for a better understanding and utilization of the natural and physical science models and data, future funding will most likely not favor funding projects to provide these services. In addition, the application of social science could be of significant help in making budgetary decisions (e.g., protecting those with highest social utility) and would provide more efficiency and effectiveness to OAR research, there is no expectation that financial support of social science will increase in the foreseeable future as we recognize the challenges associated with increasing capacity in any area during a declining budget. It is very unlikely that additional financial support for the social sciences in OAR will come from redirection of support for the natural and physical sciences. In addition, the informal partnerships between OAR laboratories and the external community addressed above are expected to continue. However, since no funding from OAR is involved, the maintenance of such partnerships is challenging and the expectation of significant accomplishments from these partnerships focused on OAR priorities and expected outcomes is low.

NOAA’s National Ocean Service

Social Science in NOS

The health of our coasts is intricately connected to the health of our nation's economy and society as a whole. The National Ocean Service (NOS) translates science, tools, and services into action, to address threats to coastal areas such as climate change, population growth, port congestion, and contaminants in the environment, all working towards healthy coasts and healthy economies. All of these goals are inexorably linked to a better understanding of humans and how they behave. In order to plan for, execute and gauge success, it is imperative to meet the following objectives:

- Enhance NOAA's ability to monitor, understand, evaluate, and communicate socioeconomic benefits of NOAA/NOS information, services, and products.
- Provide more accurate and comprehensive decision-support tools for management of ecosystems and their services by integrating social science and natural science.
- Improve models and methods for assessing the impact of human and natural disturbances to coastal and ocean resources and infrastructure.
- Increase the relevancy of NOAA efforts by improving understanding of the needs, knowledge, perceptions, and values of NOAA partners and constituents.

In order to do this, NOS must develop and apply data, tools and expertise, including[2]:

- Development of data streams for social, behavioral, and economic data and trends;
- Development and application of economic and social valuation methods and approaches;
- Science-based tools and information for assessing hazard risk, vulnerability, and resilience;
- Development and application of economic valuation methods and approaches;
- Understanding the social and economic implications of management strategies.

Social Science Mandates and Drivers

Legal Mandates

The National Ocean Service (NOS) is a diverse agency with a broad range of legal mandates that support the portfolio of NOS missions. A subset of NOS mission areas has legal mandates that explicitly call for the conduct and application of social science to support the mandate objectives. There are also several mandates without direct calls for social science that also contain elements that could not be accomplished without social science.

- *Coastal Zone Management Act:* Provides federal grants to states for the development and implementation of coastal zone management programs to "achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural,

[2] These are paraphrased from the requirements of the NGSP Resilient Coastal Communities and Economies Goal, described in more detail below.

historic, and aesthetic values, as well as the needs for compatible economic development." (OCRM, CSC, MBO, NCCOS)

- *National Marine Sanctuaries Act*: Requires the Office of National Marine Sanctuaries (ONMS) to develop management plans that require social science to design and evaluate the economic and societal impact of management strategies and regulations. (ONMS)
- *National Historic Preservation Act*: Requires that agencies develop a program for identifying historic and cultural resources for listing in the National Register of Historic Places and to take into consideration actions that could adversely affect historic properties listed (ONMS)
- *National Environmental Policy Act*: For all management plans and regulations, NOAA must develop environmental impact statements that include socioeconomic impacts. (ONMS)
- *Oil Pollution Act*: NOAA requires economic analysis to quantify environmental damages caused by oil pollution. Quantifying damages includes the economic valuation of lost natural resources and services and, in some cases, valuing the benefits of restoration.(OR&R)
- *The Comprehensive Environmental Response, Compensation, and Liability Act:* NOAA seeks compensation for restoration that is designed to offset the economic consequences of damages to natural resources. Economic analysis/valuation are needed to determine damages. (OR&R)
- *Harmful Algal Bloom and Hypoxia Research and Control Act*: Includes a "comprehensive and coordinated national research program to develop and demonstrate prevention, control, and mitigation methods to reduce the impacts of HABs on coastal ecosystems (including the Great Lakes), public health, and the economy." (NCCOS)

Strategic Documents

NOAA's Next Generation Strategic Plan (NGSP) charts the path that NOAA will follow to meet its mandates and accomplish its mission. Within this plan there are explicit goals and objectives related to NOS that have social and economic elements. Based on these elements, NOS Program Offices have developed individual strategic plans that call for social science inputs and have contributed to implementation plans for NGSP objectives. Additionally, there are numerous standing Commissions, which have produced reports with implications for NOS, that require social science.

A major driver for NOS social science is the NGSP Resilient Coastal Communities and Economies Goal. The objectives under this goal call for a wide variety of social science data, tools, and analytical expertise, including:

- Development of data streams for social, behavioral, and economic data and trends;
- Science-based tools and information for assessing hazard risk, vulnerability, and resilience;
- Socio-economic benefits studies of products and services;
- Assistance to communities in adapting to, and mitigating climate;
- Assessment of the socioeconomic impacts of moving shipping lanes; and
- Coastal and marine spatial planning, and regional ecosystem conservation approaches.

Another major strategic driver is the NOAA Annual Guidance Memorandum, which includes specific calls for social science expertise, for example, economic analysis to determine natural resource damages, which provides the funds for coastal restoration. Other important strategic drivers for NOS social science include:

- U.S. Commission on Ocean Policy 2004 Report;
- America's Living Oceans: Charting a Course for Sea Change (Pew Oceans Commission);
- OCRM Strategic Plan for 2007-2012;
- NOAA Coastal Services Center Strategic Plan;
- Interagency Oceans and Human Health Research Implementation Plan of 2007;
- Executive Order 13547-Stewardship of the ocean, or coasts and the Great Lakes; and
- NOAA-United Nations Environment Program to implement the Global Program of Action.

FY 11 Snapshot of NOS Social Science Capability

When considering how social science can contribute toward the mission of NOS it is important to first consider where the agency stands now in terms of its capability to conduct and apply social science. This section represents a characterization of the current NOS social science capability including elements such as form, geographic distribution, social science disciplines, and relationships with other agencies.

Social science disciplines, training, and job descriptions

Social science capacity can be described in terms of the discipline in which NOAA employees and contractors are educated, their level of training, and the responsibilities and opportunities afforded by the job description. Even when social science positions have been created at the agency, gaps in capacity may exist if these positions are not filled by adequately qualified staff. Similarly, job requirements may limit the opportunities available for staff with ample social science education to use this education to apply social science methods, even if they bring a degree of social science knowledge to their positions.

In-House Capability

In-house capability includes federal employees in a social science job series, federal employees who are not in a social science job series but who spend some or all of their time conducting and applying social science methods, and contract employees engaged in social science. The following table lists social science staff by NOS Program Office.

Table 1: National Ocean Service In-House Social Science Capability

Program Office	FTE's	Contract Staff	Program Office	FTE's	Contract Staff
ONMS	2	0	**OCS**	2	0
CO-OPS	0.1	0	**CSC**	5.4	2.25
MBO	2.5	0	**NGS**	2	1
NCCOS	1	2	**OR&R**	2	1
OCRM	3.25	2.25			
			Total	**20.25**	**8.5**

External Capability

External social science capability is conducted by the awarding of contracts and grants to consulting firms or academic practitioners. This approach is flexible; it can be readily used when the need is present and when funds are available. The use of external expertise varies significantly depending upon the needs of the Program Office, and the table below shows the amount, in thousands of dollars, allocated in FY 11 by Program Office.

Table 2: National Ocean Service External Social Science Capability

Program Office	Contracts ($K)	Grants ($K)	Program Office	Contracts ($K)	Grants ($K)
ONMS	36	0	**OCS**	113	0
CO-OPS	0	0	**CSC**	320	0
MBO	1	0	**NGS**	100	0
NCCOS	505	203	**OR&R**	100-500	0
OCRM	0	150-200			
			Total	**1,050-1,450**	**353-403**

Geographic distribution of social science capability

One important factor to consider is whether NOS social science capability is where it is needed. For certain social science applications, capability based at headquarters may be appropriate. In other cases, the social science need may be regional or local in nature. Although it is important

to assess the geographic distribution of our current capability, this does not address where social science work actually takes place, merely the physical location of the capability. The challenge here is to link social science skills and abilities with knowledge of local, state and regional issues and stakeholders. The distribution of in-house NOS social science expertise is as follows:

Table 3: Geographic distribution of NOS social science capability

HQ	53.1%	Great Lakes	0.5%
Northeast	0.5%	Gulf of Mexico	1.4%
Mid-Atlantic	0.5%	West Coast	16.5%
Southeast	27.2%	Pacific	0.5%

Social Science Disciplines

Historically, NOS social science has mainly been represented by economics. The reason for this is that the majority of the NOS mandates calling for social science have been related to economic impacts. As the agency evolved, the need for other social science disciplines became more apparent, and the current social science at the agency includes other disciplines. It is important, as the need for social science is assessed, to understand what disciplines we currently have and what will be needed as the agency moves in to the future. The following table presents the distribution of in-house NOS social science disciplines:

Table 4: NOS Social Science Disciplines

Economics	44.4%	Interdisciplinary Social Science	12.1%
Geography	9.5%	Anthropology	6.0%
Demography	3.6%	Marketing	3.2%
Sociology	12.3%	Organizational Development	8.9%

Cooperative Institutes and Other Vehicles

NOS does not utilize Cooperative Institutes for social science at present. However, in FY 11 the ONMS began discussions with different departments at East Carolina University (ECU) - a Cooperative Ecosystems Study Unit (CESU) - that address human dimensions, sustainable tourism, and economics. It is expected that in the future ONMS social sciences will utilize CESUs for social science support.

Partnerships

NOS also conducts social science work through both formal and informal partnerships with other entities by working toward a common goal without the exchange of funds. These entities may be states, non-government organizations (NGOs), other federal agencies, or local governments. The

following is a sample of the kinds of social science work that take place in NOS through partnerships

- *Issue Specific Partnerships:* Several Program Offices participate in the Marine Ecosystem Services Partnership (MESP), a broad partnership to support development and maintenance of an on-line database of studies on the valuation of ecosystem services, and the National Ecosystem Services Partnership (NESP), a partnership of the public and private sector to enhance collaboration within the ecosystem services community and to strengthen coordination of policy and market implementation and research at the national level. (ONMS, CSC, OCRM)
- *Internal Partnerships*: There are several examples of partnerships within NOAA. For example, NOS works closely with NMFS social scientists in National Marine Sanctuary management actions that affect the fisheries. This involves analyzing management strategies and regulations that impact the fisheries. (ONMS)
- *Partnerships for Provision of Social Science Data:* Two offices partner with the Bureau of the Census, Bureau of Labor Statistics, and Bureau of Economic Analysis to generate Economics: Demographic data for the NOAA State of the Coast (SOTC), National Ocean Watch (ENOW) data, and NOAA Spatial Trends in Coastal Socioeconomics (STICS) Web sites. (CSC, MBO)
- *Partnerships with State and Territorial Coastal Programs*: NOS relies on these partners for local knowledge and information on what products and services are needed to achieve our respective missions. (OCRM, CSC, ONMS)
- *Partnerships with Regional and Mission-Related Associations*: Associations based on geography or based on issues have been significant partners in achieving the missions of NOS and these have considerable need for social science input. Examples of this includes the CSC working with Digital Coast partners to provide socioeconomic and other spatial data to customers, ONMS conducting socioeconomic research to support spatial planning, and IOOS Regional Associations conducting social science as outlined in the ICOOS Act.

Interagency Social Science

NOS often conducts and applies social science activities in partnership with other federal agencies. This may be related to a shared responsibility for a mission, or efficiencies found by working together. This varies among Program Offices, but the following are examples of ongoing interagency partnerships:

- *Interagency Working Group on Ocean Social Science*: A working group of the National Ocean Council that was convened to address issues identified in the National Ocean Policy. (CSC)
- *Association of Environmental and Resource Economists*: A professional association for economists working on the environment and natural resources; supported by NOAA, EPA, DOI, and USDA. (ONMS, OR&R)
- *Committee on Marine Transportation Systems (CMTS)*: NOAA is working with the CMTS to gather economic information related to the marine transportation system. (CO-OPS, OCS, NGS)

- *Individual interagency Partnerships*: Partnerships with the Bureau of Ocean Energy Management for the characterization of traditional and indigenous resources and beliefs; the National Park Service for a survey and characterization of cultural resources; U.S. Environmental Protection Agency to combine decision science with physical/natural and social sciences in development of decision-support tools. (ONMS)

Social Science Needs

When considering how social science contributes toward the mission of NOS, another major factor is what level of social science the agency needs and how this compares with existing capabilities. This can be a difficult topic, especially in times of budgetary austerity; however, an honest assessment of social science needs, presented in actionable terms, can make the agency more effective in meeting its mission.

Process, Products and Activities that Require Social Science

There are many elements of the NOS mission that have a human component. These are difficult to generalize because the missions of the Program Offices are so diverse. However, a good working knowledge of the things NOS does - products, services, processes, or other activities - that require social science can help NOS understand what its needs are and ultimately better integrate the social science expertise that is needed to support those elements. In addition to those elements described below, the NOS social science community publishes articles about its work in scholarly journals as needed. Topics include such issues as ecosystem services, valuation methodology, and coastal and ocean economics and demography.

- ONMS: develops information and tools to assess management strategies and regulations that potentially have significant socioeconomic impacts and .
- CO-OPS: utilizes customer satisfaction surveys to improve products and the delivery of products.
- MBO: provides basic socioeconomic information to the coastal management community, to be used for characterization, assessments, decision-making, and public outreach activities.
- NCCOS: conducts research on social and economic issues that are relevant to coastal and marine resource management in concert with natural and physical research.
- OCRM: maps human uses of the ocean for a wide range of ocean planning applications; conducts economic valuation studies to understand the contributions of coral reefs to local economies and the economic value to jurisdictions with coral reefs; applies social science information for better management of coastal resources.
- OCS: Sets priorities for hydrographic surveys and nautical charts; measures the societal benefit of work in order to support budget requests or defend budget; utilizes customer satisfaction surveys to improve products and the delivery of products and responses to stakeholder and Congressional inquiries; and prepares press releases.

- IPO: assesses economic values of coastal and ocean resources and what economic impacts exploitation and/or conservation will have on these resources.
- CSC: conducts needs assessments to inform the development of products and services; conducts social network analysis; develops social science tools; provides training on social science processes; serves a suite of economic data and viewers to understand the value of ocean and Great Lakes jobs to coastal communities; provides technical assistance to local, state, regional and federal agencies and organizations.
- NGS: informs program evaluation exercises, responds to stakeholder and Congressional inquiries; and prepares press releases.
- OR&R: conducts damage assessment, remediation and restoration.

Social Science Gaps

This section addresses the gap between current NOS social science capabilities and social science needs to support NOS processes, products and activities to support critical NOS outcomes. This is done in two ways. The first is an examination of the marginal changes that would bring us closer to addressing the gaps that we have identified. After that we will look at what the ideal social science structure in NOS would look like if we were not faced with an anomalous budget situation and if institutional inertia were not a factor.

Gaps based on immediate risks

The following Program Office statements represent an assessment of marginal gaps in NOS social science capability.

- ONMS: Social science coordinators for each ONMS region, along with extramural funds to help leverage partnerships to conduct socioeconomic research and monitoring. The estimated costs for the social science coordinators is about $100k per coordinator or $400k total and about $100k in extramural funds per region per year of $400k.
- OR&R: One FTE economist per regional branch would be the minimum for a total of four FTE economists. While external contractors provide support on specific damage assessment cases, there are issues with institutional knowledge and a dearth of relationships with federal and state partners.
- CSC: In order to support the environmental, social, and economic well-being of the coast, add three positions: a risk behavior/risk communication specialist, a social psychologist for behavior change expertise, and an economist to conduct non market valuation studies for ecosystem services; along with contract funds ($500K) to conduct related studies.
- CO-OPS has a need for an accurate understanding of the economics of marine transportation down to the individual port level.
- MBO: A new or shared position to increase engagement with coastal communities to fully understand social science information needs for enhanced coastal management.
- NCCOS: NCCOS can currently engage in only a fraction of the work that has been prioritized. The primary impediment to advancing research programs in the social sciences is a lack of budgetary support for research activities. An investment of at least $100K annually would facilitate the addition of social science research components to many existing and newly developed research projects within NCCOS. The lack of in-house expertise in the area of economics critically limits the office's ability to conduct needed work. Addition of a social scientist at the PhD level would fill a significant gap in

research capacity. A contractor or FTE position might be secured at the cost of $125K annually.

- OCRM: OCRM would benefit from socio-economic research and analyses to improve the understanding of stakeholder needs, community values, and perceptions that drive economic development and resource protection in our nation's oceans and coasts; information on best practices to federal and state MPA programs on a range of MPA management issues; monitoring socioeconomic conditions for long-term tracking of coral reef status and trends; field based staff in the coral jurisdictions, particularly the U.S. territories of American Samoa, Guam, CNMI, US Virgin Islands, and Puerto Rico; increase partnering within NOAA and share resources within OCRM on social science issues; and a dedicated social scientist.
- OCS: A sound methodology for determining the economic value of hydrographic surveys and nautical charts plus the data to exercise that methodology.
- IPO: Assistance and guidance in implementing partnerships, particularly under the UNEP MOA, in researching and summarizing the social benefits of improved water quality for small island nations (e.g., on impacts to health and tourism revenues).
- NGS: $200K/year. NGS has had the funding in the past to conduct social economic scoping studies, which can be initiated for between $50K and $100K. There is a need for more detailed follow-on studies which would cost several hundred thousand dollars per year. Additionally, some studies (such as those conducted through NAS/NRC) typically require commitments of several hundred thousand dollars per year.

Gaps based on immediate risks

The following Program Office statements, based on assessments by the individual Program Offices, represent a vision for social science in NOS that utilizes a variety of social science disciplines, takes advantage of partnerships and funding vehicles that have not necessarily historically existed, crosses organizational boundaries in order to most efficiently utilize existing and new social science expertise, and addresses all appropriate aspects of NOS missions.

- ONMS: Four social science coordinators, one for each region ($400k) with $100k per region to leverage partnerships ($400k). The latter would also be used for tool development using HQ and regional social science coordinators in partnerships with other NOAA social scientists or social scientists from other federal and state agencies and NGOs.
- CO-OPS: $500K/yr for contracts to determine the economic value of real-time physical oceanographic information to the many potential user groups in the U.S. This would cover the marine transportation users as well as coastal planners, academics, and private industry users. $250K/yr to gather data on users (e.g. demographics, user needs, future directions). $250K/yr to develop models of user groups to enable CO-OPS to accurately predict changes to economic parameters due to potential changes in products and services. Develop teaching tools and curriculum for primary and secondary educators for physical oceanography related to CO-OPS areas of expertise. Develop a modeling tool to predict the economic effects on a region from global sea level rise.
- Coastal Management (CSC, MBO, OCRM): Build and enhance a social science hub for coastal management providing socio-economic research and analyses and applications, improving the understanding of stakeholder needs, community values, and perceptions

that drive economic development and resource protection in our nation's oceans. This capability would provide cutting edge expertise in the form of valuation of NOS products and services; provision of foundational social science data to support enhance coastal management decisions; economic impact analysis/cost-benefit analysis; training & technical assistance in social science techniques, and ecosystem services valuation and non-market valuation studies (10 FTE). Establish corresponding regional social science expertise, including and interdisciplinary social scientist in each region (8 FTE); provide technical assistance for the use of the economic data (1 FTE); conduct cost benefit analysis of climate adaptation measures (1 FTE); provide non-market valuation studies to inform ecosystem services valuation efforts (3 FTE); training/technical assistance for integrating market and non market economic data with natural data in decision-making (1 FTE); understanding values of coastal decision makers and how they incorporate that into their decisions in a regional context (2 FTE); integration of social, natural and physical data and processes to inform coastal managers (2 FTE); expertise in social psychology (1FTE).

- NCCOS: In addition to those gaps mentioned in the section above, scientists trained and experienced in economics, human geography, political science and program evaluation research would contribute significantly to meeting research needs in NCCOS. The total cost of adding these research scientist would be approximately $500K annually. Increased opportunities to host student researchers at the graduate level and post-docs would be extremely helpful at closing capacity gaps at a lower cost. Post-docs could be hosted at a cost of $40K to $80K per post-doc, depending upon the discipline. Greater financial and administrative flexibility to forge and sustain ongoing, collaborative partnerships with other research institutions are needed. Having even a small amount of internal funding for research ($5K to $50K annually) could facilitate leveraged opportunities with other research institutions.
- OCS: Most maritime accidents are caused by bad mariner decisions. Important work could be done on human behavior to better design navigation products so as to cause better decisions to be made.
- IPO: An ideal structure would allow IPO access to staff in other NOS offices who could assist, when required, in implementing international projects/partnerships that call for social science assessment, and analyzing qualitative data that demonstrates impact and benefits of NOS international engagement.
- NGS: Utilize or share with the other Nav Services Offices (NGS, CO-OPS and OCS) one full-time economist ($150K/year).
- OR&R: Capability and capacity for methods development research (valuation and cross disciplinary) and ecosystem service valuation research (for example, the relative services provided by a restored marsh versus the injured marsh, or "environmental equivalency"), work ongoing regardless of the extent of damage assessment case work. These elements would make the damage assessment work more efficient and effective.

NOAA Fisheries Service

Social Science Mandates and Drivers

Legal Mandates

In 2011, the Department of Commerce issued 327 Final Rules (Rules). Notably, NOAA Fisheries accounted for 282 (86%) of these Rules, with other DOC sub-agencies (Bureau of Industry & Security, 32 Rules; Patent Office, 8 Rules; International Trade Administration, 3 Rules; Bureau of Economic Analysis, 2 Rules) comprising the remainder.[3] Accordingly, key drivers for NOAA Fisheries Economics & Human Dimensions Program (Program) are those Executive and legislative mandates governing the economic and socio-cultural analyses required for rulemakings including:

- *Magnuson-Stevens Fishery Conservation & Management Act (MSA, 2007)* –requires extensive economic and social data collections and assessments be conducted (additional details below);
- *Executive Order 12866:* conducting cost-benefits analyses of each management option proposed under every regulatory action;
- *Regulatory Flexibility Act:* assessing the economic impact of the Proposed and Final Rule on small entities and identifying steps the Agency has taken to minimize impacts on these entities;
- *National Environmental Policy Act:* assessing direct and cumulative economic and social impacts of regulatory options;
- *Executive Order 12898*: Agencies must make Environmental Justice part of its mission by identifying and addressing regulations that disproportionately impact minority or low income populations
- *Endangered Species Act*: requires economic assessment of critical habitat designations.

The MSA places extensive economic and social data collection and assessment requirements on NOAA Fisheries. A key MSA driver is National Standard 8, which requires NMFS to take into account the importance of fishery resources to fishing communities by utilizing economic and social data to both provide for the sustained participation of fishing communities and to minimize to the extent practicable adverse economic impacts on these communities. In addition, for each of the 47 federal fishery management plans (FMPs) and associated amendments, NMFS must assess, specify, and analyze the likely *cumulative* economic, and social effects of the conservation and management measures on, and possible mitigation measures for, participants in the fisheries and fishing communities; participants in the fisheries conducted in adjacent areas; and the safety of human life at sea. Further, NMFS must also collect economic data on commercial harvest fleets, processors and for-hire operations; conduct economic impact assessments on recreational anglers, harvest and for-hire operations; and assess the economic impacts of rebuilding plans on fishery participants.

Implementation of limited access privilege programs, now commonly referred to as catch share programs, also have substantial socioeconomic requirements. For example, participation criteria must consider the cultural and social framework relevant to the fishery; economic barriers to access to fishery; and the social and economic impacts on harvesters, captains, crew, processors, and other firms substantially dependent upon the fishery in the region or sub-region. More generally, NMFS must monitor and assess that limited access privilege programs do not result in excessive market share, are mindful of potential harmful effects on fishing communities, and ensure fair and equitable initial allocations of harvest privileges.

[3] Only the Department of Homeland Security (1,233 Rules), Department of Transportation (563 Rules), and the Environmental Protection Agency (457 Rules) issued more Rules than NOAA Fisheries or DOC.

The Endangered Species Act places additional requirements on the federal trust agencies. Marine protected species do not only interact with fisheries but with other human uses, as well. Some of these interactions are positive (e.g., whale watching) while others are negative (e.g., ship strikes on whales, pinnipeds 'occupying' private property such as pleasure boats and docks). The economic analyses underpinning regulations to protect and rebuild these stocks must take into account the full suite of benefits (use and non-use) as well as the potential costs to private businesses and households, which results in a very different suite of data requirements and analyses. Similarly, the effects of habitat restoration activities extend well beyond fisheries. For instance, salmon habitat restoration activities can affect activities such as farming, mining, non-fishing recreation, hydropower, and municipal water use. The economic analyses underpinning salmon restoration decisions must often address multiple user groups and almost always require coordination with multiple agencies.

Taken in their entirety, the high number of regulatory actions coupled with economic and socio-cultural data collection program design and management duties, modeling activities, and decision support tool development responsibilities results in a heavy workload for the NMFS economists and social scientists.

Strategic Documents

NOAA Fisheries need for an economic and social sciences capability is strongly reflected in a number of key Agency documents. In particular, the Next Generation Strategic Plan (NGSP) and the Annual Guidance Memorandum (AGM), which establishes the priorities for implementing the NGSP, clearly identify the need for a strong economic and social sciences capability to inform resource management decisions. The AGM, for example, provides clear links between the NMFS' stewardship mission to improved economic opportunities, "*NOAA will sustain efforts to end overfishing and rebuild and maintain fish stocks at sustainable levels <u>to optimize fishing opportunities, jobs, and ecosystem services.</u>*" Accordingly, the AGM identifies NOAA Fisheries ' top deliverable as "*Complete implementation of annual catch limits <u>and continue to assess economic and community impacts of these new management regimes</u>*." In the out years, FY14-FY18, NMFS is directed to "*Incorporate socio-economic information into EBM to provide LMR managers with information on the impacts, trade-offs, and distributional effects of management actions for the sustainability of marine resources and the coastal communities that depend on them.*" In addition, NOAA Fisheries leadership is relying upon its Economics & Human Dimensions Program to implement new comprehensive performance measures to evaluate the success of catch share programs, a major initiative for the Program that was initiated in FY11.

FY11 Snapshot of NMFS Social Science Capability

In-house capability & its Geographic Distribution

In addition to designing and managing over two dozen economic and socio-cultural surveys and data collection programs each year and conducting assessments in support of almost 300 Rules, NMFS economists and social scientists conduct world class research in support of living marine resource management. On average, staff publish roughly 1.5 peer reviewed scholarly journal articles each year in leading resource economics, fisheries, ecology, human dimensions and general science journals. These articles demonstrate the depth of the NMFS Economics and Human Dimensions Program, with journal articles covering such diverse research topics as catch share program analyses and evaluation; marine spatial planning / fishing ground closures; recreational fishing valuation; adaptive management; effects

of climate change on fisheries; protected species valuation and valuation of actions to improve protection for threatened and endangered species; evaluation of habitat restoration strategies; regional economic impact analysis, seafood markets and trade; ecolabeling; aquaculture economics; integrated ecosystem modeling; disaster assessments; and ethnographic studies and socio-cultural research. Further, the journal publication process provides transparency and external peer review to the Agency's economic and socio-cultural research, ensuring that the "best available science" required under MSA for fisheries management is, indeed, the best science available anywhere.

NMFS has taken a phased and distributed growth approach to building its Economics & Human Dimensions Program. Since NMFS began to ramp up its social science capability in 2001, the number of positions in the Headquarters Offices have increased from eight FTEs in 2000 to 13 FTEs but filled positions have returned to 2000 levels at eight FTEs (see Table 5). In contrast, the number of economists and social scientists in NMFS' regional offices has more than doubled (increasing from 29 FTEs in 2000 to 64 FTEs onboard and eight vacancies). In FY11, NMFS had 86 economist and social scientist FTE positions, including 14 vacant positions. Due to the decrease in funding for this program in FY12, those positions will remain vacant indefinitely.

Internal partnerships are also critical to running a cost-effective but high impact economic research and data collection program. Economic data collection costs are held down by adding economic questions to logbook programs, observer programs, permit programs and the Marine Recreational Information Program angler intercept survey. Integrated, interdisciplinary research conducted by the program relies upon other NMFS scientists and managers, especially those in stock assessment, protected resources, and habitat. The program also directly supports the NMFS National Environmental Policy Act Program Office and the Aquaculture Office. NMFS also partners with OAR Sea Grant on the NMFS-Sea Grant Marine Resource Economics Fellowships, workshops (e.g., upcoming National Community Supported Fisheries Workshop) and research (recent examples include oral histories in fishing communities at risk to sea level rise as well as industry research, e.g., for-hire economic data collection and assessment, a seafood dealer survey, and seafood market research.

Table 5: In-house NMFS capability & its Geographic Distribution[4]

	HQ[5]	NEC	SEC	AFSC	NWC	SWC	PIC	SERO	AKR	NWR	SWR	PIRO	Sub-Total
STAFF (84 positions; 72 FTEs)													
Economists	11	10	8	8	8	9	5	5	3	1		1	
Vacancy	(3)	(2)	(2)		(1)	(1)	(2)				(1)		
Social Scientists	2	5	1	2	2		2	2					
Vacancy	(2)												
Total Positions	13	15	9	10	10	9	7	7	3	1	1	1	86
Staff On-board	8	13	7	10	9	8	5	7	3	1	0	1	72
TERM FTES													
Economists				1									

[4] HQ: Headquarters, NEC: Northeast Fisheries Science Center, SEC: Southeast Fisheries Science Center, AFSC: Alaska Fisheries Science Center, NWC: Northwest Fisheries Science Center, SWC: Southwest Fisheries Science Center, PIC: Pacific Islands Fisheries Science Center, SERO: Southeast Regional Office, AKR: Alaska Regional Office, NWR: Northwest Regional Office, SWR: Southwest Regional Office, PIRO: Pacific Islands Regional Office

[5] In FY11, Headquarters (HQ) economists and social scientists worked for the Office of Science & Technology, the Office of Sustainable Fisheries, the Office of Habitat Conservation and the Office of Protected Resources.

Social Scientists													
Total				1									1
CONTRACTORS													
Economists	1	1	1	1		.25	2				1		
Social Scientists		1		3	2.5	.25	3						
Data Management		2	1	2		0.5							
Total	1	4	2	6	2.5	1.0	5				1		22.5

External Capability. The NMFS Economics & Human Dimensions Program primarily contracts for data collection, economic and socio-cultural research, IT support services for data management and data access tools, GIS support, and academic services (see Table 6). Some of these services are also conducted under grants or cooperative agreements with the Marine Fishing Commissions, to which NMFS can issue sole source grants, or through Sea Grant. Headquarters and field offices both award contracts and grants, with Headquarters providing additional contract support to the field offices through an IDIQ contract that is centrally managed by the Office of Science & Technology.

In FY11, the majority of NMFS economic and social science funds were obligated under contracts, with the balance (approximately 35%) obligated under grants (see Table 7). The majority of the grants were to Marine Fisheries Commissions, regional bodies that include state and federal fisheries partners.

Table 6: National Marine Fisheries Service FY11 Contracts & Grants

NOAA Fisheries Economics & Human Dimensions Program Contracts & Grants	**Funding** ($1,000s of dollars)
Grants	$2,415
Contracts	$4,265
Total	$6,680

FY11 contracts and grants issued by the NMFS Economics & Human Dimensions Program by focus area is shown below in Table 8.[6]

Table 7: National Marine Fisheries Service External Social Science Capability

Program Area	**FY11 Funding ($1,000s of Dollars)**
Commercial Fisheries Economic Data & Research	1,710
---Catch Share Programs	620
---Marine Spatial Planning (FishSET)	500

[6] Note that due to the hiring delays in Workforce Management that occurred broadly across NMFS in FY10 and FY11, NMFS had considerable "labor lapse" that was directed towards major priorities for the Program including the economic tools being developed recreational fisheries (BLAST) and marine spatial planning (FishSET) and the social indicators and community profiling tool. This funding was not sustainable, i.e.., as the programmed hired staff, funding would have declined for these tools. This short burst of funding, however, enabled NMFS to make significant headway on these tools.

Recreational Fisheries Economic Data & Research (BLAST)	1,100
National Standard 8: Communities & Social Impact Assessment	1,200
Protected Species Valuation	740
Habitat Research	280
Other: Seafood Markets (includes Aquaculture)	140
--------Software Licenses, including Econ Lit (NOAA-wide)	130
--------IT support	260
Total	**6,680**

Partnerships

The NMFS Economics & Human Dimensions Program regularly partners with the state marine fisheries agencies, generally under the auspices of the regional Marine Fisheries Commissions but also through direct collaborations, particularly for data collection and data sharing. Academic partnerships occur beyond contractual relationships, with research collaborations evolving from serving on Fishery Management Council committees, Marine Fisheries Commission committees as well as through professional organizations and conferences. The co-location of many of the NMFS Science Centers with universities or research centers also facilitates collaborative research.

NMFS economists and social scientists participate on a number of fisheries committees sponsored by NMFS' federal partners:

Fishery Management Councils –Committees include the Scientific Statistical Committees, which provides scientific review of studies; Plan Development Teams and Fishery Management Action Teams, similar committees that develop fishery management alternatives and assess the effects of these options on stewardship objectives as well as their socioeconomic implications: and socioeconomic committees, which address data and modeling issues.

Marine Fishery Commissions – Committees include socioeconomic committees, recreational fishing committees, and data management committees.

Staff professional service includes serving on editorial boards of several journals including Marine Resource Economics, Coastal Management, and the Australian Journal of Agricultural and Resource Economics and are also regular reviewers for dozens of natural resource, resource economic and socio-cultural journals. In addition, staff are also active in the leadership of international professional organizations including serving leadership roles on the North American Association of Fisheries Economics and the International Institute for Fisheries Economics & Trade; Society for Human Ecology; and ICES. Staff also serves as mentors to doctoral students selected under the NMFS-Sea Grant Marine Resource Economics Fellowship Program, awarded annually to two students, and also routinely serve on thesis committees at local universities.

NMFS also collaborates with academics and other Agencies and NOAA Line Offices on several NMFS-led national efforts. FishSET is a spatial econometric modeling toolbox that provides analysts with the data and modeling tools necessary to rigorously analyze the costs imposed on fishermen from spatial management actions that restrict access to fishing grounds. Over a dozen leading spatial econometricians have contributed their regional knowledge and modeling skills to FishSET. NMFS is also collaborating with academics, other NOAA Line Office and other federal agencies to develop its Social Indicators

Decisions Support Tool. This project will provide key information on coastal communities socioeconomic status and trends, including community resiliency and vulnerability.

Interagency Social Science

Like the other NOAA line offices, NMFS often conducts and applies social science activities in partnership with other federal agencies. For example, staff participate in or lead a number of interagency working groups, including the National Science and Technology Council's Joint Subcommittee on Ocean Science and Technology (JSOST), the National Climate Assessment, the Inter-Agency Task Force for Development of a National Fish, Plant and Wildlife Climate Adaptation Strategy; and the Klamath River Economic Assessment Team. Other notable collaborations includes work with the Puget Sound Partnership and The Natural Capital Project.

Social Science Needs

The need is plain – NOAA Fisheries cannot meet legal mandates requiring economic and social impact assessments with current resources. The fisheries management workload for the NMFS economists and social scientists is daunting. For example, the range of management options that may be considered for a *single* amendment affecting the commercial harvest sector may include area closures, seasonal closures, reduced harvest, reduced bycatch allowances, gear restrictions, and capacity reduction. The range of management options virtually ensures that more than one type of economic model must be used. Further, different types of economic analyses are required for each management option. That is, for each management option, NMFS must assess the cost and benefits to the regulated entities, the direct and cumulative economic and social impacts, consider the impacts on the "affected human environment" (e.g., shoreside processors, wholesalers, marinas, bait and tackle shops, marine suppliers, marine repair and dockyards, etc.), and the financial effects (e.g., profitability and cash flow) on small businesses. A similar suite of analyses must be conducted for Rules affecting recreational fisheries. In addition, and as outlined above, the economic analyses underpinning regulations to protect and rebuild marine protected species and restore habitat must take into account the full suite of benefits (use and non-use) as well as the potential costs to private businesses and households, which results in a very different suite of data requirements and analyses. Finally, mandated economic assessments of catastrophic disasters such as Sandy strain already limited resources.

In sum, with almost 300 Rules implemented in 2011, at least one amendment and sometimes multiple amendments were implemented in almost all of the 47 highly diverse FMPs managed by NMFS.[7] Given the economic and social data collection, modeling and assessment requirements for supporting Rulemaking, it is clear that current staff is stretched too far and cannot keep pace with these demands.

Further, as the Agency shifts towards ecosystem-based management of fisheries, two truths are quite evident: 1) most ecosystem models are not integrated with economic models or even adequately grounded on economic assumptions; and 2) the Agency needs to invest more in economics and socio-cultural data and modeling if it wants to use these models to value ecosystem services and assess the trade-offs from

[7] The diversity of federal fisheries (e.g., single *vs.* multispecies; shellfish *vs.* finfish; sedentary stocks *vs.* highly migratory; small boat *vs.* industrialized fleets; geographically concentrated *vs.* geographically expansive, with a high number of active ports; etc.) is an added challenge, often limiting the applicability of a model to a small number of fisheries or even a single fishery.

alternative management decisions, including management of major drivers of ecosystem condition such as energy uses (oil, liquid natural gas, renewable energy) and land use decisions.

Process, Products and Activities that Require Social Science

NMFS economic and social science capability is responsible for assessing the economic and social impacts of all management options of every regulatory action proposed in each of the Nation's federally-managed fisheries. The goal of this capability is to identify management options that maximize benefits to society while still achieving conservation goals, thereby resulting in a resource management strategy that is consistent with both the long-term sustainability of the Nation's fisheries as well as the fishing communities that depend upon this resource for a livelihood and a way of life.

Underpinning this capability are the economic and socio-cultural data collection programs and surveys that provide the information base for meeting statutory mandates for cost-benefit analysis of regulatory actions, small business impacts, and social impact assessments. To meet these mandates, NMFS must collect economic data from commercial fishermen, processors, for-hire operations and must conduct economic assessments of commercial, for-hire and anglers, and fishing communities. Assessments include (but are not limited to) monitoring the economic performance of catch share fisheries and non-catch share fisheries; evaluating quota allocation strategies; analyzing the cost and benefits as well as distributional effects of rebuilding plans; predicting catch and effort; assessing the short- and long-run economic effects of marine protected areas; and estimating the economic contribution of fishing to the local, state and national economies; and assessing the economic and socio-cultural impacts of regulations on shoreside industry and fishing-dependent communities.

Protected species and habitat are also part of NMFS' mandate. NMFS has established a rigorous, state-of-the-art non-market valuation program for assessing the public's value for recovering threatened and endangered marine protected species and protecting or restoring marine habitats. These values can and should be included in NMFS' cost-benefit analyses, which tend to be more focused on the "cost" implications of conservation measures.[8] These values may also be used to assess the benefits obtained from NOAA's conservation and recovery efforts, thus providing a useful benchmark for valuing stock rebuilding programs, protected species recovery efforts and habitat restoration and recovery efforts.

Social Science Gaps based on immediate risks

In FY12, the NMFS Economics & Social Science Research budget line was cut 30% from $10.7M in FY11 to $7.4M in FY12. This decrease was roughly equivalent to the Program's increase in FY10. Accordingly, the Program's budget priorities identified below and the rationale behind them are much the same as those identified in the FY10 President's Request: 10 FTEs and funding for data collection and the development of social and economic decision support tools. While the funding went away, the need for these resources did not; in particular, the number of Rules issued by NMFS has not declined and the number of catch share programs, a market-based approach to management that requires substantially more economic assessments, increased.

Decision Support Tools: NMFS currently has two economic decision support tools available in all NMFS regions – a commercial fisheries economic impact tool and a recreational fisheries economic impact tool, both of which can be used to assess the effect of a fishing regulation on the local and state economy. Increased development of decision support tools will enable the Agency to work "smarter", i.e., more

[8] NOAA General Counsel has directed NMFS to provide broader societal benefit estimates in its economic analyses of management options.

cost-effectively. The three national-in-scope decision support tools NMFS currently has underway support marine spatial planning or, more specifically, fishing ground closures (FishSET); a recreational fisheries economic decision support tool for evaluating management options (BLAST); and a social indicator / community profiling web-based tool that support social impact assessments. These three tools are described briefly below:

FishSET –this ecosystem modeling tool uniquely includes both data management tools and predictive behavioral models that are needed to rigorously assess the trade-offs from marine spatial management strategies that restrict fishermen's access to fishing grounds. The model includes predicting the fishermen's response to fishing ground closures and does so in a risk framework. NMFS is currently piloting FishSET in Alaska; none of the other regions have this capability.

BLAST – NMFS recreational fisheries economic decision support tool is underpinned by an integrated, dynamic bioeconomic model that may be used to analyze the effects of size and possession limits in a recreational fishery as well as the economic benefit streams associated with alternative rebuilding scenarios. BLAST will also provide essential information for making allocation decisions. Importantly, not only will BLAST improve assessment quality, it reduces the time required to run an assessment 20- fold, dramatically reducing labor costs. NMFS is currently piloting BLAST in the Northeast. The model will be reviewed by the New England Fishery Management Councils and Mid-Atlantic Fishery Management Council in September 2012 and is anticipated to be fully operationalized in these regions for selected fisheries by December 2012. No other regions, including the South Atlantic and Gulf of Mexico where recreational fishing is greatest, have a comparable capability.

Social Indicators / Community Profiling Tools – this tool will provide analysts with key demographic and community economic and socio-cultural data necessary to assess the potential social impacts of a regulatory action. Beyond data, the Toolbox will provide metrics for community resiliency, community vulnerability, gentrification, as well as a mapping tool, which will make it easier to identify agglomeration effects, i.e., groups of less resilient or vulnerable communities, which may compound the initial impacts on any individual community. NMFS has provided seed funding to this project for the Atlantic Coast and Gulf of Mexico. Prior to the FY12 funding cut, NMFS anticipated delivering a fully-operational decision support tool for fishery managers in New England, the Mid-Atlantic, South Atlantic and Gulf in FY13. Depending upon FY13 funding decisions, it may be possible to implement the Gulf Toolbox; the other three regions will not be ready until FY14, at the earliest. The other NMFS regions and their associated Fishery Management Councils do not have this capability.

Data: Currently, the Agency is only meeting 55% of its commercial fisheries economic data collection requirements and roughly 30% of its recreational fisheries economic data collection requirements. Closing these gaps is a priority for the Program.

***Staff*:** The FY10 President's Request included 10 FTEs for this Program. The distribution of these 10 FTEs by region and focus area is provided below:

- 2 FTEs, Southeast Fisheries Science Center (recreational economist, spatial econometrician);
- 2 FTEs, Northeast Fisheries Science Center (recreational economist, spatial econometrician);
- 2 FTEs, Pacific Islands Fisheries Science Center (recreational economist, spatial econometrician);
- 1 FTE, Alaska Fisheries Science Center (social scientist)
- 1 FTE, Northwest Fisheries Science Center (commercial fisheries /catch shares economist)
- 1 FTE, Southwest Fisheries Science Center (bioeconomic modeler)
- 1 FTE, HQ Office of Science & Technology (social scientist)

Recreational Economists: One recreational economist is needed in the Southeast because currently there is only one recreational economist at this Center despite the large number of recreational fisheries in this region. Northeast and Pacific Island also each need a recreational economist. Neither Center has a dedicated recreational economist nor staff with expertise in designing stated preference choice experiments, the state of the art survey method for assessing the costs and benefits of proposed management options.

Spatial Econometricians: One spatial econometrician is needed in the Northeast because the previous spatial model was built prior to catch shares and ACLs and different modeling skills are now required. The Southeast and Pacific Islands Centers entirely lack this capability.

Social Scientists – one social scientist (anthropologist or sociologist) is needed in Alaska, which has a significant Native American population as well as a high number of fishing communities with poverty rates and unemployment rates well above the national average. One social scientist is needed in the NMFS HQ Office of Science & Technology to oversee the national social science program and to support the NMFS HQ Office of Sustainable Fisheries and the NMFS HQ NEPA Office, neither which have a social scientist on staff.

Commercial Fisheries / Catch Shares Economist: the Northwest Center requires an economist to support its recently implemented catch shares program in the Pacific trawl fishery. This program was implemented with significant mandatory economic data reporting requirements, which were originally intended to be supported by the position funded originally in FY10 but no longer exists due to the budget cut in FY12.

Bioeconomic Modeler: the Southwest Center intends to implement the recreational fisheries decision support tool and then apply the same approach to a commercial fishery.

Ideal structure of the NMFS Economics & Human Dimensions Program

NMFS' ideal structure for its economics and social science program was identified in FY07 budget documents as 140 FTEs. As the nascent program grew and began to develop increased tools for meeting management needs, the projected number of FTEs required to fully meet NMFS' economic and socio-cultural assessment requirement was adjusted downward in FY09 budget documents to 120 FTEs and a budget of $27.2 million (inclusive of FTEs).

Table 8: NMFS Ideal Structure of Social Science Capability

Program Area	Average Annual Funding
120 FTEs	$18,000
Commercial Fisheries Economic Data & Research	2,300
---Catch Share Programs	1,200
---Marine Spatial Planning (FishSET)	600
Recreational Fisheries Economic Data & Research	900
--Recreational fisheries economic evaluation tool (BLAST)	1,100
National Standard 8: Communities & Social Impact Assessment	1,200
Protected Species Valuation	600
Habitat Research	700

Other: Climate Impacts on Fisheries / Fishing Communities; Seafood Markets, Software Licenses; Trade;	600
Total	**$27,200**

Implications in FY 13 and Beyond

The budget was cut 30% in FY12. There were no budget offsets for these cuts. This has precluded the program from backfilling vacancies (20% of the Program's FTEs). In addition, without additional funding in FY13, NMFS will have to let go an estimated 50-70% of the 23 contractors currently employed by the Economics & Human Dimensions Program. Additional implications for this cut include cutting funding for FishSET, an economic spatial modeling decision support tool that predicts fishers response to management strategies and assesses the cost-benefits of those options in a risk framework, by 60%, delaying the roll out of this tool in the Alaska region one year and two years (2015) in the Gulf of Mexico and will not be expanded to any other region. In addition, all funding for BLAST, the Agency's new integrated recreational economic model currently being piloted in the Northeast and planned for expansion on the West Coast, Mid Atlantic and Gulf was eliminated. **In fact, funding for recreational fisheries economic data collection program will be at a near 20 year low despite the Agency's priority for improving the science and management of recreational fisheries.**[9] Funding for NMFS Social Indicator Toolbox, which was intended to fulfill the Agency's NEPA Social Impact Assessment requirement, was also cut 50%.

Restoring the funding to FY10 levels would generate major returns to the Agency. The once nascent Economics Program was poised to deliver major decision support tools for both commercial and recreational fisheries. The integrated recreational economics decision support tool is already operational on a pilot basis in the Northeast and is poised for expansion in three other regions, with remaining regions to follow shortly after. This tool will allow NMFS to assess a range of management strategies, including allocation, rebuilding plans, and bag limits, literally at the push of a button. Likewise, FishSET could provide this same operational capability – modeling the cost-benefits from fishing ground closures, the creation of MPAs, or other coastal and marine spatial management strategies driven by the needs of other user groups (energy, aquaculture, etc.) – at the push of a button.

At current funding levels, these capabilities will not be achieved. Further, not only do these cuts place the Agency at risk for increased court challenges from both stakeholders and environmental organizations, at these reduced funding levels, NMFS may actually lose these lawsuits.

[9] See "Recreational Saltwater Fisheries Action Agenda" p. 6. Department of Commerce, NOAA, NOAA Fisheries. October 2010. http://www.nmfs.noaa.gov/sfa/PartnershipsCommunications/recfish/2010RecfishActionAgenda.pdf

National Weather Service

National Weather Service (NWS) Social Science Mandates and Drivers

Legal Mandates

NWS does not have any specific legal mandates with direct calls for social science, however, the below legal mandates cannot be effectively accomplished without social science.

- Organic Act of 1890: Established a United States Weather Research Program to (1) increase benefits to the Nation from the substantial investment in modernizing the public weather warning and forecast system in the United States; (2) improve local and regional weather forecasts and warnings; (3) address critical weather-related scientific issues; and (4) coordinate governmental, university, and private-sector efforts.
- 49 USC 44720 stipulates provision of meteorological services for the safe and efficient movement of aircraft in air commerce
- Public Law 107-253, the Inland Flood Forecasting and Warning System Act of 2002, authorizes NOAA to conduct research and development, training, and outreach activities related to inland flooding
- 15 USC 1532 authorizes NWS space weather activity
- 33 USC 3201, authorizes NWS tsunami warning program; among others.
- Presidential Policy Directive/PPD-8 – National Preparedness:

Strategic Documents

NOAA's Next Generation Strategic Plan (NGSP) establishes a long-term goal of a Weather-Ready Nation (WRN), as part of NOAA's broader vision of resilient ecosystems, communities, and economies. NWS has elaborated on this NGSP goal in its Strategic Plan – Building a Weather-Ready Nation – and in its Weather-Ready Nation Roadmap which describes transformational concepts and activities in the near term (1-2 years), mid-term (3-5 years), and long term (5+ years) to further three high-level outcomes:

- America is a Weather-Ready Nation through superior Impact-Based Decision Support Services (IDSS).
- In an environment of continuous improvement, NWS and the entire Weather Enterprise provides state-of-the-art service delivery that saves more lives, protects more livelihoods, and further enhances the U.S. economy.
- Federal, state, and local governments depend on NWS as their trusted, reliable source of weather, water, and climate information – from the global scale to the community level.

Further, as part of the WRN initiative, NWS has established a series of six (6) pilots to test the principles of WRN, including impact-based decision support services and social science into its operations.

Another major strategic driver is the NOAA Annual Guidance Memorandum, which includes specific calls for social science expertise, for example, improving high impact weather and water forecasts. Priorities include continued support for NOAA's Hurricane Forecast Improvement Project; timely and accurate water forecasts; improved fire weather research and services; and improvements in forecasts and preparations for low-frequency, high-impact events such as solar weather events and tsunamis. *"Across each of these areas, targeted social science research and analysis could be used to create more effective decision support capabilities and to better convey forecast risk and uncertainty."*

Another important strategic driver for NWS social science is the NOAA Research Council, Research in NOAA: Toward Understanding and Predicting Earth's Environment, A Five-Year Plan: Fiscal Years 2008-2012, which articulates that *"…social science is explicitly tied to NOAA's mission: how the agency affects people and how people effect their environment. Research toward these ends is programmatic; it is an essential part of normal operations of any NOAA program to achieve its stated outcomes."*

Current Snapshot of NWS Social Science Capability

When considering how social science can contribute toward the mission of NWS it is important to first consider where the agency stands now in terms of its capability to conduct and apply social science. This section represents a characterization of the current NWS social science capability.

In-House Capability

Since NWS is largely comprised of physical scientists, and at this time has very few social scientists in its employ, the current modus operandi has been to hire contractors to conduct needed research versus conducting research in house. While the research conducted by these contractors is good, the piecemeal approach leaves the potential for research to be disjointed with no guarantee of follow-up research or continuity. Further, NWS has attempted to avoid duplication by leveraging existing capabilities at OAR and NOS/CSC and began the process for long time social science capacity building within NWS.

Internal Partnerships

NWS conducts most of its social science work through both formal and informal partnerships with other entities by working toward a common goal. These entities include other NOAA line offices, federal and state agencies, or local governments. The following is a sample of the kinds of social science work that take place in NWS through partnerships.

Office of Program, Policy and Integration (PPI): Under the direction of the NOAA Chief Economist, NWS recently completed the first installment of NOAA's updated economic statistics titled "Value of a Weather-Ready Nation." Individuals from the NWS Strategic

Planning and Policy Office participated in the development of a white paper entitled "Identifying Methods for Quantifying the Societal Impacts of NOAA," as an outcome from a June 2011 NOAA Science Challenge workshop. The Workshop brought together social science leaders from inside and outside the Agency convened to explore methods for better quantifying the ways in which NOAA affects society. The June 2011 Workshop was the first phase of a multi-phase process for conducting the NOAA Needs Assessment to help NOAA further identify its social science capacity as well as its social science needs.

Office of Oceanic & Atmospheric Research (OAR): NWS has worked with OAR to leverage research funded by the US Weather Research Program (USWRP). In 2004, through funding received by USWRP, the National Center for Atmospheric Research (NCAR) established the Collaborative Program on the Societal Impacts and Economic Benefits of Weather Information (aka Societal Impacts Program, or SIP) to create a dedicated focal point for assembling, coordinating, developing, and synthesizing research and information on the societal impacts and economic benefits of weather information for the benefit of the weather research and forecast community and the public as a whole.

NWS utilized information coming out of current research, namely the Hurricane Forecast Improvement Project (HFIP) Socio-Economic Impacts Assessment (SEIA) and the jointly NOAA-NSF funded Communicating Hurricane Information, as a compliment or starting point for additional research based on communicating risk and uncertainty, specifically as it relates to communicating tropical and storm surge information, in an attempt to avoid duplicative research and to build upon research findings.

In addition, economic valuation information stemming from three papers funded under USWRP: Assessment of Total Household Benefits of Improved Hurricane Forecasting, 300 Billion Served: Sources, Perceptions, Uses, and Values of Weather Forecasts and Sensitivity of the U.S. Economy to Weather Variability, were highlighted in NOAA's economic statistics "Value of a Weather-Ready Nation, various Congressional testimony and included in the NWS Roadmap as justification for the value of weather information.

NWS leveraged the ongoing relationship with the National Center for Atmospheric Research's Societal Impact Program (NCAR SIP) to conduct additional research relating to the NWS public forecast web pages to determine how NWS information could more effectively convey its weather information, specifically how to better communicate warning information. NWS has also been a supporter of the SIP Weather and Society*Integrated Studies (WAS*IS), a self-articulated grassroots movement, intent on changing the weather enterprise by integrating social science into meteorological research by participating in and supporting a couple of summer workshops.

Finally, NWS and OAR worked together to provide funding and support for a joint research-to-operations competition entitled "Social Science Research to Build a Weather Ready Nation," intended to foster social science research towards better understanding human behavior and positively affecting decision-making during weather-related events. The FY 12 award(s), totaling about $879,000 for four, two-year projects, are for work conducted by the Cooperative Institute for Mesoscale. Meteorological Studies, the University of Oklahoma, Arizona State

University, East Carolina University, the University of North Carolina, and the Nurture Nature Center in Easton, Penn.

National Ocean Service Coastal Service Center: As with OAR, NWS continues to coordinate extensively with NOS' Coastal Service Center on social science research and activities. CSC and NWS have worked together to coordinate joint concerns on storm surge and coastal inundation relating to tropical and extra-tropical events. Specifically, CSC has helped fund the Assessing Current Storm Surge Information from the Public Perspective and the Storm Surge Information Needs Assessment research intending to utilize the findings from the research into storm surge inundation graphics and clearer warnings. Further, CSC helped facilitate the utilization of its Indefinite Duration Indefinite Quantity (IDIQ) funding vehicle with Eastern Research Group to assist with the HFIP Socio-Economic Research and provided funding to help with the prototyping, testing and retesting of storm surge and tropical graphical forecasts resulting from the social science research.

Finally, discussion and activity is underway for CSC to assist NWS in the facilitation of surveys and focus groups and NWS to work closely with CSC on the communication of risk and vulnerability.

Office of the Federal Coordinator for Meteorology (OFCM): In May 2010, OFCM created an interagency Exploratory Social Science Working Group on the social science aspects of meteorological services and supporting research to facilitate the exchange of ideas and information. NWS participated on the Working Group and helped develop a report entitled Framing the Questions – Addressing the Needs Moving to Incorporate Social Science Results into Meteorological Operations/Services.

NOAA's Science Advisory Board (SAB): The SAB has been a vocal advocate for the integration of social science and created the *ad hoc* Social Science Working Group. The Working Group developed two Reports, one in 2003 and 2009, both of which articulated that *"social sciences continue to be underrepresented in NOAA's research, operations, and decision making,"* and was the impetus for the NOAA Social Science Needs Assessment. Further, the SAB's Environmental Information Services Working Group (EISWG) has as part of its charge to provide advice on incorporating scientific and technical capabilities to enhance NOAA products and services, which includes the integration of social science. The EISWG members have been strong advocates for social science research to operations.

External Partnerships: NWS has developed partnerships and worked extensively with the American Meteorological Society (AMS) and the National Research Council (NRC) in expanding support and assistance in integrating social science into NWS operations and services.

External Capability

External social science capability is conducted by awarding contracts and grants to cooperative institutes, universities or consulting firms. This approach is flexible and can be readily used when the need is present and funds are available. While current fiscal limitations restrict the amount awarded, utilizing external expertise is one way to expand the breadth of social science expertise.

Cooperative Institutes and Other Vehicles. In the past, NWS has utilized Cooperative Institutes for conducting social science. For example, social science research through the investigation of socioeconomic impacts of mesoscale weather systems and regional-scale climate variations has been undertaken at the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS) at the University of Oklahoma. In addition, through the Cooperative Institute for Climate and Satellite (CICS) and the NWS Office of Science and Technology, NWS Office of Climate Weather and Water Services, the Office of Atmospheric Research and the Renaissance Computing Institute (RENCI) together funded the Weather and Emergency Management Decision Support (WxEM) project to explore ways to make NWS information easier to find, easier to understand, and easier to apply in operations by the Emergency Management community. WxEM deliverables include infusion of weather and climate information into decision processes for risk and crisis management and the development of prototypes that enable effective weather translation. The project's value is best represented in the capturing of its iterative process for determining communication needs and requirements of the emergency management community, which in turn will be beneficial to the NWS Central Region Demonstration Project

Interagency Social Science. NWS often conducts and applies social science activities in partnership with other federal agencies. This may be related to a shared responsibility for a mission, or efficiencies found by working together. This varies among Program Offices, but the following are examples of ongoing interagency partnerships:

- Department of Homeland Security (DHS)
- Federal Emergency Management Administration (FEMA)
- United States Geological Survey (USGS)
- Natural Resources Conservation Service (NRCS)
- U.S. Army Corps of Engineers (USACE)
- Center for Disease Control (CDC)

As an example, NWS hydrologic services require extensive collaboration and partnerships with other federal agencies, including (but not limited to) the USGS, USACE, US Bureau of Reclamation, FEMA and NRCS with the Integrated Water Resource Science and Services (IWRSS) program. Through this collaboration, NWS can improve coordination both in the forecast process and subsequent product dissemination. The outcome of these activities includes:

- Clearer conveyance of hazards to emergency managers, and the general public
- Better risk management through communication of flood risk
- Dissemination of multi-agency hydrologic information through a single, integrated federal web portal.

Social Science Needs

When considering how social science contributes toward the mission of NWS, it is important to determine what level of social science the agency needs and how this compares with existing capabilities.

Process, Products and Activities that Require Social Science

NWS has made strides toward integrating social science into its long-term planning and guidance including the NWS Strategic Plan, NWS Roadmap and its associated pilot projects, where NWS tests IDSS concepts and the integration of social science into forecast operations. Further the campaign to become a more "Weather-Ready Nation," fancies a nation that is ready, resilient and responsive to severe weather and other environmental hazards. Social science, integrated into NOAA's physical science, effectively communicates NOAA information and best prepares the nation to respond to the impacts of a particular weather hazard.

The inclusion of the social sciences into the delivery of meteorological operations and services within NWS dates back to the early 1970s, where social scientists were engaged by the NWS to fine tune and reword its warnings and messages. However, the need still exists to further use, disseminate and communicate meteorological and hydrological information in ways that the public understands and its partners can use.

While social science covers many disciplines, the two main areas where NWS has identified social science need and gaps are in the areas of Risk Communication and Economic Valuation

The following, by NWS Program Office, represent an assessment of some of the marginal gaps in NWS social science capability:

OCWWS/OHD:

- Effective communication of risk and forecast confidence in its products and services for better decision-making;
- Comprehensive understanding of how Core Partners and the public perceive and use data and services;
- Performance measurements relating to societal outcomes/impacts and decision tools;
- Evaluation and articulation of the value and effectiveness of NWS' products and services;
- Estimation and demonstration of the benefits of programs and efficient use of resources;
- Economic valuation studies relating to new and improved existing services / products / models;
- Developing and evaluating approaches for education and communication.

OST:

- Operational processes that include the integration of social science into new skill sets, communication tools and decision support tools before they are operational;

- Comprehensive understanding of user decision processes and risk tolerances leading to identification of needs for forecast confidence / probabilistic products;
- Development of format and presentation considerations of probabilistic/confidence information for customers;
- Incorporation of societal impacts into the forecast process;
- Tools that generate forecast confidence information and services based on social science outcomes;
- Forecaster training and increased educational requirements in social sciences;
- Cost-benefit and cost-effectiveness analysis to determine payoffs to programs.

OOS:

- Public understanding and behavioral response to warnings and alerts
- Geographic and demographic analysis that would influence the operation and maintenance of warning systems over time
- Identification of data users and assessment of their needs (e.g. most effective data dissemination methods)
- Incorporation of social science applied research into the infrastructure on which it depends
- Economic cost-benefit analysis to aid in decision-making when budgetary resources are inadequate to maintain fully all systems and equipment
- Performance metrics to evaluate outcome effectiveness
- Non-market valuation of OOS' systems and services

Social Science Gaps

Some of the challenges in the effective integration of social science into NWS operations relate to 1) culture, 2) current fiscal realities, 3) the research to operations gap, 4) performance metrics based on societal outcomes and 5) personnel needed to conduct effective social science.

Culture: While NWS has made strides in the past few years toward better integrating social science methodologies and principles into its products, information and services, a culture and a mindset of "we produce physical science here and social science is something done elsewhere," still exists. In many instances, NWS continues to incorporate social science as an afterthought to its products or services versus inclusion at the beginning of a product's development. Utilization of social science in this manner fails to take into account a user's understanding of or need for a particular product or service and results in the development of products or services that may not be as effective in communicating information Thus resulting in miscommunication of information and an inefficient use of government funds and manpower.

Fiscal: Current fiscal restraint has made the possibility of set aside, line-item social science funding difficult to secure. Currently, most social science research activities are funded on an ad hoc, piecemeal basis.

Research to Operations Gap: The infusion of social science research into operations has been challenging. The disjointed and piecemeal approach to conducting social science research has provided NWS with good information, but no organized manner with which to test the information and put research findings into operation. There has been some discussion as to whether social science should be included as a component of each of the NOAA Testbeds or whether there should be a standalone social science testbed, however, an argument can be made that a standalone social science testbed may further stovepipe the integration of social science. The Hazardous Weather Testbed located in Norman, Oklahoma, shows some promise as it is designed to accelerate the transition of promising new meteorological insights and technologies into advances in forecasting and warning for hazardous mesoscale weather events, including innovative applications of social science techniques in order to make the transition to operations even more socially relevant.

Performance Measurements/Metrics: To fully integrate social science, NWS must move forward in establishing performance metrics on progress toward achieving societal outcomes and impacts. GPRA measures for NWS focus on the quality of the forecasts and warnings; in addition, NWS should develop metrics to monitor its progress in how these forecasts and warnings affect the human dimension and the economic well-being of the nation.

Personnel: NWS is largely comprised of physical scientists with only a few social scientists. For successful integration to occur, NWS should look to hire individuals with scholastic degrees in the social sciences, but with expertise or knowledge in the climate, weather and water arena, but also train their employees to understand social science concepts and approaches. The intent of training NWS physical scientists is not to transform the NWS workforce into social scientists; but rather, to provide the NWS workforce with adequate tools and understanding for the integration of relevant social science with decision support. For the foreseeable future, given current budget realities and leveraging the current function and social science personnel in place within NWS and NOAA, it is recommended NWS hire an economist to assist with and direct economic valuation projects. The economist would work in collaboration with the risk communication specialist in developing the social science coordinating structure discussed in the below section on ideal social science structure.

Fully Operational Social Science

The following represents a vision for social science in NWS that utilizes a variety of social science disciplines, takes advantage of partnerships and funding vehicles that have not previously existed, crosses NOAA and NWS organizational boundaries in order to efficiently utilize existing and new social science expertise, and addresses all appropriate aspects of NWS missions.

In order to maintain a well-coordinated, functioning organization towards the integration of social science across NWS, there needs to be a coordinating role maintained at NWS Headquarters to seamlessly integrate science and service throughout NWS and be able to raise critical issues to senior NWS leadership. Such a position would be well poised to 1) coordinate and plug into the broader NOAA social science efforts and ensure programmatic coordination and alignment with the NOAA Strategic Plan, Annual Guidance Memorandum, NOAA Strategy

Execution and Evaluation (SEE) Process, the NWS Strategic Plan, and the Weather-Ready Nation efforts and its associated pilot projects. Further, this coordinating role would help with the training and education portion of the OCWWS Training Branch and the NWS Operational Proving Ground (OPG) in its development of social science training modules and educational materials to help familiarize NWS physical scientists with the capabilities of the social sciences and the intricacies of impact-based decision support services.

As previously stated, to handle the workload and provide the expertise needed, NWS should hire individuals with scholastic degrees in the social sciences, but with expertise or knowledge in the climate, weather and water arena. To address some of the social science gaps listed above, some of the potential hires should include: a risk behavior/risk communication specialist, a social psychologist for behavior change expertise, a decision theory specialist, a cognitive psychologist and an economist to supervise the collection of data on the economic impacts of weather events and to conduct economic valuation studies. Any proposed workforce changes would be done in accordance with Labor Management Relations regulations.

The intent is for these individuals to interface with NWS programs and provide social science analyses, develop supporting data, conduct applied studies and oversee consultant studies in coordinating social science across the agency, integrating it where appropriate in research, programmatic, and planning functions. To effectively integrate social science, and form a solid foundation of social science expertise, NWS must commit to hiring social science expertise in specific and diverse social science disciplines. It is recommended NWS begin with small steps, hiring a limited number of social scientists and assessing and adjusting as is deemed effective. Movement toward an effective social science capability by starting with a small percentage of the workforce dedicated to social science is the most expedient way to success.

In addition to the coordinating function/office maintained at NWS Headquarters, full coordination and integration of social science should also include social scientists within its NWS Regions and Centers. Below is a recommendation for future inclusion of social scientists into NWS Regional Offices, NWS National Specialized Centers and the National Water Center. Due to current budgetary constraints, this is meant to be a viewed as a <u>vision</u> for fully integrating social science into NWS operations and not a current mandate for new FTEs.

Regional Offices: Currently, assessments focus on the need for social science disciplines focused on economic valuation, risk communication and human behavioral specialists; however this may change as NWS and NOAA advance their social science capabilities and capacity. A total of 12 FTE positions (2 per Region) are recommended: 1) One FTE risk behavior/risk communication specialist per regional branch, and 2) one FTE economist to conduct locally based economic valuation studies and damage assessments within their Region. One of the Regional hires should also fill the role of a social science coordinator for each NWS Region coordinating any social science work conducted within their respective area, coordinating extramural funds to leverage external and internal partnerships conducting socioeconomic research and monitoring the training of impact-based decision support and social science training within their Region and coordinate with NWS Headquarters.

National Centers: There is also value in having social scientists work at certain NWS National Centers (e.g., National Hurricane Center, Storm Prediction Center, and Space Weather Prediction Center). Based on evaluation of need and requirements for each Center, it would be beneficial to have a similar structure as the Regions in having a risk behavior/risk communication specialist and an economist to help with the integration of social science within the Centers. Again, one of the two hires should also fill the role of a social science coordinator able to coordinate any social science work conducted at their respective Center and coordinate with NWS Headquarters.

National Water Center (NWC): The NWC construction will be complete in 2013, and will begin operations in 2014. The center will provide a suite of new, high-resolution, summit-to-sea water resource products. A 2011 report for the NWS Corporate Board specifically addresses the need for social scientists at the Center: *"Development of decision support tools for water resources management would require the addition of a new range of expertise. Social science personnel would provide decision support skills, including social science, communications, water law, economics and education."*

External Capability: NWS should continue to support and develop additional external institutional arrangements and relationships with partners who have social science expertise in the private sector, academic and research sectors, regional, state and local communities, NGOs and cooperative institutes. As social science capacity within NWS continues to develop, NWS should continue to support and utilize social science research conducted outside NOAA by collaborating with external research and professional organizations (i.e. Cooperative Institutes, NCAR SIP, SSWIM, etc.)

The external community is quite supportive towards the integration of social science into meteorological products and services. Leveraging off their support and ability to provide expertise and guidance relating to social science will further help NWS integrate social science.

Implications for Social Science FY 12 (and beyond)

Current fiscal restraint has made the possibility of set aside, line-item social science funding difficult to secure. As noted previously, to date, most social science research activities are funded on an *ad hoc*, piecemeal basis.

More troubling are the budgetary challenges for FY13 and FY14 that will likely stymie forward movement on Weather-Ready Nation initiatives and erode NWS' ability to nurture its social science capacity. NWS is at a point where its current *ad hoc*, piecemeal approach to integrating social science will not enable it to fully achieve the goals of a Weather-Ready Nation. The current approach will not enable NWS to effectively carry out its mission as it cannot be certain it is designing and delivering products, information and services that best match the needs of its constituents, provide the best value to the Nation, or be certain its resources are allocated optimally across programs and objectives. Without continued and expanded investment in social science in terms of funding and personnel through the SEE and budgeting processes, NWS commitments toward "initiating a national conversation/dialogue…on how to improve the nation's resiliency against severe weather", including remarks made to the broader Weather and Climate Enterprise Community by NOAA and NWS Leadership regarding their intent to fully

integrate social science into its products, information and services, will not be executed and the resulting benefits will not be realized.

For the various social science research and projects currently underway, the current fiscal environment does not guarantee follow-up research beyond existing commitments or the ability to integrate the research into operations. Examples of fiscal concerns within the portfolio of NWS social science project are highlighted below:

OCWWS: There are no additional funds to conduct social science in the areas of hazard messaging (watch, warning, advisory), address the social science gaps noted in the NWS Service Assessments, nor funds to develop and conduct social science training modules needed to train the NWS workforce in social science concepts and approaches, and decision support services.

OST: A reduction in funding for OST limits the amount of funds available for social science research. Of specific concern, is funding for the Hurricane Forecast Improvement Project (HFIP). As it stands, HFIP is scheduled to sustain a significant cut in FY14 and the portion allocated to social science research and storm surge risk and prototyping could be in jeopardy.

OHD: As with OCWWS and OST, budget cuts have affected OHD. Before FY 12 cuts, OHD was planning to allocate as much as $200K to partner with the USGS to initiate a multi-year project to complete a socioeconomic assessment of *Integrated Water Resources Science and Services (IWRSS).* IWRSS information will depict the extent and depth of potential floodwaters over time to more effectively visualize, assess, plan for, and mitigate the impacts of floods. This improved information product will enable emergency managers and society to more effectively plan, respond and mitigate flood events which will lead to reduced socioeconomic impacts.

Office of Operational Systems (OOS): Operating and maintaining the infrastructure that enables social science initiatives requires resources. Currently, there is no dedicated funding in OOS for social science needs. As NWS implements our strategic plan, we will seek to integrate social science into operations during the program planning and budgeting cycles, specifically in the areas of geographic and demographic analysis to help influence the operation and maintenance of warning systems over time and the identification of data users and assessment of their needs.

National Environmental Satellite and Data Service

Social Science Mandates and Drivers

Legal Mandates

The structure of the NESDIS organization is focused mainly on the creation of environmental hardware – satellites and sensors – that are a major contribution to the overall architecture of the NOAA observing system to provide information to all the NOAA offices to assist them in performing their mission related activities. There does not appear to be any legal mandates that currently guide the social science considerations for NESDIS alone, but there maybe some connection and collaboration with other projects that do require social science considerations, including economic impacts, for reporting within and outside of NOAA.

Strategic Documents

NOAA's Next Generation Strategic Plan (NGSP) charts the path that NOAA will follow to meet its mandates and accomplish its mission.

The NESDIS vision is to be the world's most comprehensive source and recognized authority for satellite products, environmental information, and official assessments of the environment in support of societal and economic decisions. To achieve the vision, NESDIS does the following:

- Operate the world's premier environmental satellite system, and the Nation's National Environmental Data Centers, fulfilling customer requirements for quality and timeliness of data.
- Collaborate with other agencies and organizations to describe changes to our climate and the implications of those changes.
- Continue to lead the effort with other agencies and countries in establishing a global observing system to meet the world's information needs for weather, climate, oceans, and disasters.
- Deliver state of the art products and services based on cutting edge operations, science, and applications.
- Partner with industry, academia, and other research and development agencies to facilitate the introduction of new techniques and technologies into our operations.
- Bring robust information and service delivery to our customers and invest in effective relationships with stakeholders and our partners in the media and private sector.
- Develop a skilled, energetic, and dedicated workforce through training, motivation, and teamwork.

FY 11 Snapshot of NESDIS Social Science Capability

When considering how social science can contribute toward the mission of NESDIS it is important to first consider where the agency stands now in terms of its capability to conduct and apply social science.

Form of social science capability

In assessing the need for social science, the form is critical to matching the capability to the specific needs. While certain forms may be used more widely due their relatively lower requirements for funding and personnel, they may not always be ideal from an overall

perspective, when elements such as learning curves, institutional memory and efficiency are considered. NESDIS' responsibility to the production of environmental satellites makes it a unique partner to the other NOAA programs. Its capability for social science focuses on the examination of future satellites and the analysis of the data that is downloaded and used by various NOAA partnerships.

In-House Capability

In-house capability includes federal employees in a social science job series, federal employees who are not in a social science job series but who spend some or all of their time conducting and applying of social science, and contract employees engaged in social science. Although we have employees with degrees in fields being noted as social science, we do not have any in job series or positions within NESDIS that are specifically dedicated to social science work within the organization. The following table lists social science staff by NESDIS Program Office[10].

Table 9 - NESDIS In-house Social Science Capability[11]

Program Office	FTE's	Contract Staff	Program Office	FTE's	Contract Staff
AA	3	0	**OSPO**	0	0
NCDC	8	0	**OSD (GOES-R/JPSS)**	0	1
NODC	0	1	**CFO**	0	0
NGDC	1	0	**IIA**	7	0
STAR	0	2			
Total	19	4			

Geographic distribution of social science capability

One important factor to consider is whether NESDIS social science capability is where it is needed. For some applications having the entire capability at headquarters may be appropriate. Although it is important to assess the geographic distribution of our current capability, this does not address where social science work actually takes place, merely the physical location of the capability. The challenge here is to link social science skills and abilities with a knowledge of local, state and regional issues and stakeholders. The approximate estimates of distribution of in-house NEDIS social science expertise is as follows:

[10] Includes the aggregation of employees who are working on social science part time.

[11] These employees are not engaged in social science activities full time – it is actually less than 10% for each person.

Table 10 - Geographic Distribution of NESDIS Social Science Capability

HQ	10
Boulder, CO	2
Asheville, NC	3
Stennis, MS	1
Kansas City	1
Fairbanks, AK	1
Fort Worth TX	1
Honolulu HI	1
Taunton, MA	1
College Park, MD	2

Social Science Disciplines

Historically, NESDIS has had very little social science has mainly been represented by economics. It is important, as the need for social science is assessed, to understand what disciplines we currently have and what will be needed as the agency moves in to the future. The following table presents the distribution of in-house NESDIS social science disciplines no way of knowing our capabilities :

Table 11 - NESDIS Social Science Disciplines

Economics	3	Interdisciplinary Social Science	*6*
Geography	4	Anthropology	*0*
Demography	0	Marketing	*1*
Sociology	3	Organizational Development	*3*

Social Science Needs

Social Science Gaps

This section addresses the gap between current NESDIS social science capabilities and social science needs to support NESDIS processes, products and activities to support critical NESDIS outcomes.

- Improve the understanding of the data use by customers to assist in the articulation of societal benefits of satellite data. Collection of feedback and anecdotal information about how data is being used will help create opportunities to deliver faster, and more directed information if necessary.
- Increase the partnerships between other NOAA line offices and external partners to develop opportunities to incorporate other NESDIS programs that can bridge the connection between satellite products and data and social science requests. As NOAA and NESDIS begin to reach out to those utilizing products for their sectors and industries, the improvement of the collection and dissemination of data improves and allows for end users like utility companies and agricultural producers to make more informed decision that could affect their products and services to communities.
- Build a more comprehensive cost benefit analysis and use of data to assess the needs for the construction of environmental satellites and sensors. This will help to prioritize and focus the design methods on how to better serve the community based on current financial needs and capabilities. Determining what industries and partnerships will benefit most can drive requirements and allow for consideration how to expand outward instead of trying to meet multiple needs upfront and then trying to specify.
- Evaluate the social science capabilities within NESDIS and examine if changes need to be made to the NESDIS succession planning documents for upcoming years. Determine if social science needs should be contracted or brought on staff and examine pros and cons for each of those personnel decision.

Implications for Social Science in FY 12

NOAA's Next Generation Strategic Plan focuses on three areas: Science, Service and Stewardship. It is within each of the aforementioned areas that NESDIS plays a prominent role; yet without the incorporation of social science perspectives, the mission may be overwhelmed with technical solutions that may not convey the necessary benefits to the nation. As noted earlier, NESDIS' mission is to provide data for the other NOAA LO's and external partners, therefore their social science needs and structure will vary from other organizations.

Providing support to internal NOAA partners like the National Weather Service in forecasting extreme weather events, and their economic impacts. There is also justification for supporting societal connections, outside the economic data. It is this expanded focus that will need to continue, looking beyond just the financial considerations, and examining how the society as a whole needs and benefits from the design, production, and launching of weather satellites. NESDIS will continue to work closer with other NOAA Line Offices and external Federal partners to highlight those connections that display the needs and the uses by partners, to ensure their needs are met through the development of hardware to collect required data that assists in the social science needs of their programs. The incorporation of the Regional Climate Service

Directors (RCSDs) has increased the level and cooperation of social science within NOAA through their work with the societal challenges and between NOAA and its external partners. The increased incorporation of economic analysis for satellite development could benefit not only the development of data services within the organization can also benefit from additional social science analysis in an effort to better articulate and inform products designed to address those requirements.

Future opportunities are bountiful for the inclusion of the satellite products and services, and connecting their benefits within NOAA and to its external partners only enhances the public understanding of the financial needs of the programs.

NOAA’s Program Planning and Integration

NOAA's Program Planning and Integration

PPI Summary

PPI provides corporate management to coordinate NOAA's many lines of service with the Nation's many needs for environmental science, service, and stewardship. It ensures that investments and actions are guided by a strategic plan; are based on sound social and economic analysis; adhere to executive and legislative science, technology, and environmental policy; respond to regionally-specific stakeholder needs; and integrate the full breadth of NOAA's resources, knowledge, and talent to achieve its mission. (source: PPI Homepage)

The NOAA Chief Economist is located in PPI. The Chief Economist serves as NOAA's Senior Economic leader and advisor to the Administrator and all Line Office Assistant Administrators, for all aspects of NOAA's economics and social science efforts in support of NOAA's mission, goals and priorities. The Chief Economist fosters excellence in the economic and social science domain, and provides leadership and influence in the direction of NOAA's policies and resource services.

See PPI's Economics and Social Sciences website for further information:
http://www.ppi.noaa.gov/economics/

Social Science Mandates and Drivers

Strategic Documents

PPI fulfills a corporate role at the agency and does not draw its authority or raison d'etre from any particular strategic documentation. On behalf of NOAA, PPI produces or leads the development of several of strategic documents including The Next Generation Strategic Plan (NGSP), Annual Guidance Manual (AGM), and Business Operations Manual (BOM), as well as the Corporate Portfolio Analysis (CPA) and the Progress to Plan (P2P) process.

The NGSP and the AGM direct the agency to fulfill its mission to promote the well-being of the nation. The NGSP states that "NOAA's vision centers on a holistic understanding of the inter-dependencies between human health and prosperity, and the intricacies of the Earth system." (p. 29)

Language such as this, which exemplifies the agency's growing focus on integrating the physical and social sciences, can be found throughout NOAA's strategic documents.

The focus on harnessing a scientific understanding of the Earth system to benefit human health and prosperity shapes PPI's social science focus, and guides the relationship between the Chief Economist, who reports directly to the PPI Assistant Administrator, with social scientists throughout various NOAA line and program offices. While there is no foundational mandate that guides the activities of the Chief Economist, the position is guided by the NGSP and reflects NOAA priorities. The Department of Commerce has a Chief Economist, but the duties of that Chief Economist are not related directly to NOAA and instead focus on the Economics and Statistics Administration (http://www.esa.doc.gov/category/offices/office-chief-economist).

Current Social Science Capability

In-house capability

In-house capability includes federal employees in a social science job series, federal employees who are not in a social science job series but who spend some or all of their time conducting and applying social science, and contract employees and fellows engaged in social science. In PPI's case, in-house capability also includes those in the Intergovernmental Personnel Act (IPA) mobility program.

At time of the data call:
At the time of the data call, PPI's office of the Chief Economist was in transition. While all of PPI's social science capabilities have historically been completely in-house, the Chief Economist position has been filled over the course of the last three years by a series of academic postings to the position through the Intergovernmental Personnel Act. At the time of the data call (summer 2011), PPI's in-house social science capability included one full-time IPA (Chief Economist) who was transitioning to a part-time IPA (25%), one graduate student fellow (20%, working through the Office of Education), and one full-time contractor.

Other:
From time to time, PPI analysts may have social science backgrounds. Much of the work of analysts requires some understanding of basic social science constructs and concepts, but none of the analysts are required to have social science training.

Geographic distribution of social science capability

All of PPI's social scientists are located in Silver Spring, Maryland.

Social Science Disciplines

Since PPI's inception in 2005, social scientists within PPI have strictly been economists. Currently, all of PPI's social scientists are economists, as defined by both academic degree and job series.

Intra-agency Social Science

The Chief Economist leads the Research Council's Social Science Committee. Additionally, the Chief Economist has led a group of lead social scientists from each of the line offices. This group consists of the core of the Research Council's Social Science Committee and attempts to share information on social science activities occurring within each of the line offices.

The Chief Economist participates on a number of intra-agency working groups that have a strong social science mission. These include the "Blue Carbon Working Group," "MPAs, Ecosystem Services, and Climate," "Ecosystem Services Coordination," etc.

Interagency Social Science

The Chief Economist (PPI) represents NOAA at certain high-level inter-agency venues. The following are examples of recent or ongoing interagency partnerships:

- Inter-Agency Working Group on Ocean Social Sciences (IWG OSS) (of the National Ocean Council), for which the Chief Economist has served as a co-chair; and as a Group representative on of the Coastal and Marine Spatial Planning (CMSP) writing team
- National Science and Technology Council's Sub-Committee on Economic, Social and Behavioral Sciences;
- National Science Foundation (NSF)-NOAA Social and Behavioral Economics working group;
- The National Ecosystem Services Partnership

Social Science Needs

Process, Products and Activities that Require Social Science

Major duties of the Chief Economist include, but are not limited to:

a. Ensure rigor and consistency of economic activity across agency
b. Act as a point of contact for social science info
    i. Headquarters, Science Advisory Board, NSF, Office of Science and Technology Policy, Sub-Committee on Ocean Science and Technology, Friends of NOAA, etc.
c. Assist Line Offices with limited social science capacity
d. Provide leadership for Research Council
e. Create a Community of Practice for Social Scientists

Historically, the Chief Economist has been responsible for compiling an annual report of economic statistics related to the Agency's Work (The Economic Statistics of NOAA, now online). The Chief Economist also has been called upon to review economic statistics used by NOAA headquarters in speeches, press releases, and Congressional Testimony.

Under the leadership of the current IPA Chief Economist, the Office of the Chief Economist has taken a more active role to ensure that economic statistics used internally and presented externally by the Agency meet high standards of rigor. This includes a review of all of the Economic Statistics of NOAA and a repackaging of these statistics in ways that:

i. Provide better guidance about the use of statistics in communications
ii. Provide guidance on the use of NOAA-wide economic information (oceans and coasts)
iii. Develop a framework for communicating and quantifying the value of NOAA

To better distribute data on the Value of NOAA, the Chief Economist supervises the dissemination of data on the PPI website - www.ppi.noaa.gov/economics. These data include

iv. The Value of a Weather Ready Nation
v. The Economic Value of Resilient and Productive Coastal Communities
vi. Stories / Value Chain Narratives about the Value of NOAA
vii. Pocket Guide to Ocean and Coastal Economic Data

The Chief Economist respond to requests from Headquarters for fact checking and input.

The Chief Economist could take a larger role in developing performance metrics.

Finally, the Chief Economist provides input into major PPI documents and process including the Strategic Plan, the AGM, and the Strategic Execution and Evaluation process.

Social Science Gaps

Fully Operational Social Science

To be effective in the roles described above the Chief Economist needs to have substantial academic stature and significant competency in working within a large and diverse bureaucracy. The Chief Economist would benefit from a mandated authority to implement standards or to require collaboration among the line offices. The Chief Economist also would benefit from a dedicated budget to undertake NOAA-wide analysis on social and economic issues. Currently, neither a mandated authority nor a dedicated budget for the Chief Economist exist.

To fulfill the day to day needs for rapid response items (e.g. input into PPI processes or requests from headquarters), PPI would benefit from one or more senior economists with significant graduate training and work experience. Ideally, two such positions would be maintained recognizing that the expertise needed for "climate and weather" matters is often different than that for "coasts and fisheries." Having two senior economists with a depth of subject matter knowledge in these areas would greatly improve the ability of the Chief Economist to focus on leadership across the whole of NOAA. In the future, PPI anticipates supporting the Chief Economist and two economist positions.

The Chief Economist also needs a full-time assistant to provide direct support in conducting the work of the Chief Economist - especially in the maintenance of NOAA economic and social science statistics and data. Such an assistant should have substantive training in the social sciences.

Gaps based on immediate risks

The Chief Economist position has not been filled with a permanent fulltime FTE since 2008. This gap is due to a combination of budgetary constraints and a general lack of qualified applicants for a permanent Chief Economist position. The Chief Economist previously was advertised as a Senior Executive Service (SES) position - one that requires a substantial amount of administrative experience. In the last call for candidates, many applicants that possessed the required academic stature for the position did not have the administrative experience needed to qualify for an SES appointment. For this reason, an SL level of appointment is being pursued.

Since 2008, the position of Chief Economist has been filled by temporary (and now part-time) IPA assignments.

During this time, the use of social science at the agency and the desire to better coordinate social science across the agency has grown tremendously. Failure to fill the Chief Economist with a permanent hire could seriously jeopardize this momentum. The current staffing (25% IPA Chief Economist, two detailees, one contractor, and a 20% graduate fellow) are insufficient to meet the current demands on the office.

GAPS – 3 FEDERAL FTE (Chief Economist and two senior social scientist positions to support the Chief Economist)

Implications into the Future

PPI does not have a specified budget line or allotment of funds for the social sciences. As with most Federal agency offices, the expectation is that budgets will remain constant or decrease in the foreseeable future. PPI has some flexibility in its ability to staff social scientists depending on the current makeup of the office, as the budget is split by position type (i.e. federal employees, contractors, etc.) rather than having a specific budget item for 'social sciences'.

Another mechanism PPI utilizes to enhance its social science capability is to create temporary detail positions for social scientists. Details will generally be brought in for short-term work with a very-specific scope, but these sorts of details have been used infrequently and for specific studies or reports. While these details are particularly useful in accomplishing specific projects, they are not appropriate for the bulk of the work required of the Chief Economist - e.g. maintaining data, providing leadership and coordination of social science, acting as a point of contact for NOAA headquarters.

In 2012, the junior economist position at PPI was vacated and currently is empty. The Chief Economist IPA was renewed at 25% through 2013 and a senior social scientist with significant social science background will move to PPI at the end of the year to support the Chief Economist IPA.

NOAA’s Office of Marine and Aviation Operations

OMAO Summary

As NOAA's operational component, OMAO supports a variety of missions and includes the NOAA Commissioned Corps, one of the Nation's seven uniformed services. OMAO's and the NOAA Corps' roots trace back to 1807 when President Thomas Jefferson ordered the first comprehensive coastal surveys. These early surveys ensured safe passage of ship-born cargo for our growing Nation. The mission of OMAO has grown as well. Today it is the foundation for an expansive set of scientific research and operational objectives, as well as NOAA's emergency response capabilities. OMAO and the NOAA Corps support almost all of NOAA's missions – from hydrographic, ecosystems, and fisheries surveys to weather and atmospheric research. These critical missions help to protect lives and property and support billions of dollars in American commerce each year.

Each year, OMAO supports hydrographic surveys, fisheries surveys, and atmospheric, hydrologic, and climate research missions. In addition, during a normal hurricane season, OMAO pilots conduct "hurricane hunter" missions and the NOAA Corps is ready to support special operations in times of crisis, such as the Deepwater Horizon oil spill response. As the demand for science continues to grow, OMAO will likely need additional data collection and observation assets and innovative solutions to keep up with this growing demand. (source: 2012 – 2016 OMAO Strategic Plan)

See OMAO's website for further information: http://www.omao.noaa.gov/

Social Science Mandates and Drivers

Legislative Authorities or Drivers

NOAA's legislative mandate to construct, maintain, and operate platforms is derived from Title 33 of the U.S. Code. Additionally, the Hydrographic Services Improvement Act (HSIA) updated the authorization for the NOAA Commissioned Corps, originally established by the Act of May 22, 1917.

Strategic Documents

NOAA's Next Generation Strategic Plan (NGSP):
NOAA is challenged to provide increasingly accurate and reliable environmental and ecological information and services to meet the demands of society. Under NOAA's Next Generation Strategic Plan (NGSP), OMAO plays a key role in supporting NOAA's Science and Technology Enterprise Objective: Accurate and reliable data from sustained and integrated earth observing systems. This mission, rooted in Earth and space observations, charges OMAO with sustaining and enhancing atmospheric-oceanic-terrestrial-biological and human observing systems,

collecting and maintaining long-term observational data sets, and transitioning new observing technologies to operations.

2012 – 2016 OMAO Strategic Plan:

2012-2016 OMAO Strategic Plan is directly aligned to NOAA's strategy as outlined in the NOAA Next Generation Strategic Plan (NGSP), and reflects the culmination of broad involvement, leadership dedication, and a wealth of balanced input and feedback. The OMAO Strategic Plan offers a clear path forward over the next five years and is supported by a framework for measurable, incremental progress towards five long-term goals:

1. Mission-Ready Assets
2. Highly-Skilled, Adaptive, and Flexible Workforce
3. Strong Partnerships
4. Innovative Processes, Technologies, and Solutions
5. Best-Value Stewardship of Resources and Investments

In order to execute NOAA's mission, OMAO procures, operates, manages, maintains, and properly dispose of a portfolio of assets, leverages new and emerging technologies, invests in personnel expertise, and proactively works with NOAA's scientists to understand their research and science requirements.

FY 11 Snapshot of OMAO Social Science Capability

In-house capability

For the purposes of this assessment, in-house capability includes federal employees in a social science job series, federal employees who are not in a social science job series but who spend some or all of their time conducting and applying social science methods, and contract employees engaged in social science. OMAO does not have an in-house social science capability but, as part of their core mission, it does support programs and activities that support social science needs. Additionally, OMAO's workforce includes officers of the NOAA Commissioned Corps. These officers, trained in science, technology, engineering and math, may have applied their technical knowledge, operational expertise and knowledge of platform capabilities to social science efforts within their assigned positions across NOAA and its Line Offices.

Social Science Disciplines (at time of the 2011 data call)

As stated above, OMAO does not have an in-house social science capability. However, some of their workforce may have been educated in social science disciplines. In 2011, OMAO's workforce consisted of 627 civilian/wage mariner positions and 318 NOAA Corps Officers. Decomposing the social science advanced education within OMAO's workforce, the tables below depict: Table 13 - the discipline and number of degrees held by the civilian/wage mariner

workforce and Table 14 - the discipline, number and type of degrees held by NOAA Corps Officers.

Table 12 - OMAO Civilian/Wage Mariner Social Science Degrees

Academic Discipline Descriptions	Total
Applied and Resource Economics	1
Conservation and Natural Resources	1
Criminology	1
Economics, General	1
Geography	1
Parks, Recreation and Leisure Studies	1
Social Sciences and History, Other	1
Sociology	2
Grand Total	9

Table 13 - NOAA Corps Officers Social Science Degrees (Sept. 2011)

Academic Discipline Description	Associates	Bachelor	JD	Masters	MBA	PHD	Total
Administration				1			1
Anthropology		3					3
Business Administration	1	1		3	3		8
Coastal Zone Management				1			1
Economics		3					3
English		1					1
Geography		5		2		1	8
History		4					4
Juris Doctor						1	1
Kinesiology		1					1
Law			1				1
LLM in Mineral Law and Policy				1			1
Marine Affairs				1			1
Political Science		4					4
Psychology		1					1
Public Administration				3			3
Public Health				1			1
Public Policy				1			1
Social Science	1						1
Grand Total	**2**	**23**	**1**	**14**	**3**	**2**	**45**

Although the tables above show a number of OMAO personnel with social science educational backgrounds, these employees are not employed within social science positions, and may not necessarily engaged in or support social science research or activities. Additionally, due to

civilian job series work restrictions, NOAA Corps assignment agreements and organizational operational needs, these individuals may not be available to support social science activities.

External capability/Partnerships

OMAO often supports social science efforts, either by providing personnel, infrastructure, or products, to support the needs of line offices, federal agencies or other external partners.

Geographic distribution of social science capability

Most of OMAO positions are located throughout the Continental US, Alaska, and Hawaii. However, OMAO does operate a fleet that has global range and has some NOAA Corps assignments in remote locations, such as American Samoa and Antarctica.

Interagency Social Science

OMAO does not represent NOAA at social science venues. OMAO's primary customers are NOAA's Mission Goals and Line Offices; however, OMAO also works with external partners; such, as the University National Oceanographic Laboratory System (UNOLS), US Coast Guard, US Navy, and NASA – and we are active members and play a leadership role with the Interagency Coordinating Committee for Airborne Geoscience Research and Applications (ICCAGRA) and the Interagency Working Group on Facilities and Infrastructure (IWG-FI) in order to meet NOAA's science mission.

Social Science Needs

Process, Products and Activities that Require Social Science

Most of OMAO's social science activities have come in the form of emergency preparedness and response support, technical standards development, as well as educational activities. OMAO, a service organization, supports the majority of these acitivies through partnerships with other interagency functions or external partners. Therefore most of the social science needs to fully understand the social benefits that arise from processes, products and activities, would be captured by social science staff support outside OMAO.

OMAO distributes resources to social science activities depending on support requirements or needs for the defined activity; therefore it is difficult to quantify the annual in-house capability support. It is OMAO core mission to support the following activities:

Emergency Preparedness and Response Support: Almost every American community, at some point in their history, has been touched by critical incident or disasters which endangered life, disrupted operations, or cause environmental damage. Any one event has the ability to cripple a community. OMAO, through planning and coordinated federal efforts, employ resources and capabilities to assess damage and hasten recovery. OMAO supports the following are activities related to "Emergency Preparedness and Response Support":

- Historically, OMAO supports Hurricane awareness tours through personnel and infrastructure support. The NOAA team includes the crew of the NOAA P-3 Hurricane Hunter aircraft and forecasters from the National Hurricane Center. The team is joined at each stop by federal, state and local emergency management officials, non-profit organizations such as the American Red Cross and various local National Weather Service forecast offices. NOAA uses the Hurricane Awareness Tour to get the message out to communities emphasizing preparation, and safety. NOAA has conducted the hurricane awareness tour for almost 30 years, alternating between the Gulf and Atlantic coasts.

- Homeland Security Program Office (HSPO) is a NOAA-wide matrix program, which reports to the NOAA Office of the Chief Information Officer (OCIO). The program is responsible for coordinating the delivery of NOAA's products, services, and capabilities to Federal, state, and local emergency managers and responders, and strengthening NOAA's own infrastructure to protect agency personnel, facilities, and information services. HSPO ensures NOAA's continuity of operations to support the nation's mission essential functions, and coordinates all homeland security and response-related plans and policies to provide an integrated effort across NOAA. OMAO provides two NOAA Corps Officer Positions in support of this program: the Director of HSPO and liaison officer supporting United States Northern Command (Northcom). OMAO has deployed ships, aircraft and personnel, to aid in recovery efforts, and requires NOAA Corps officers, OMAO civilian personnel to staff NOAA's Incident Coordination Center above and beyond normal duties.

- Because of their special capabilities, NOAA ships and aircraft may be called upon to provide immediate response to unpredictable events. NOAA survey ships located the wreckage of EgyptAir Flight 990, TWA Flight 800 and John F. Kennedy Jr.'s aircraft. NOAA ships, aircraft and personnel also conducted damage assessments after major spills from the Exxon Valdez and Deepwater Horizon, September 11, 2001 terrorist attacks, and after major hurricanes—most recently Hurricane Sandy in 2012.

- NOAA Search-and-Rescue Satellite-Aided Tracking (SARSAT) System was developed in a joint effort by the United States, Canada, and France. Once the system was functional, its operation was turned over to NOAA where it remains today. OMAO provides a NOAA Corps Officer, assigned as a SARSAT Operations Support Officer. In addition, NOAA vessels have on many occasions assisted fellow mariners in distress.

Technical Expertise and Standards Development: OMAO programs and activities support technological innovations that will ensure NOAA's continued leadership in science and engineering, and response to both short-term and long-term societal needs.

- NOAA's navigational services provide critical support to our nation's maritime economy and position it for future growth. The Hydrographic Services Improvement Act (HSIA) requires NOAA to maintain hydrographic expertise, to ensure the funds used to conduct surveys and improve methodology in support of nautical charting and scientific application continue to be efficiently utilized. OMAO operates 4 hydrographic survey vessels and almost all hydrographers within NOAA in the past have been commissioned officers that have spent their careers rotating between ships and hydrographic survey related shore assignments. The National Hydrographer, who represents the United States in negotiations with foreign governments on cooperative agreements and standards for hydrographic surveying and nautical charts, is appointed from the members of the NOAA Corps Officers.

- Mississippi River Commission (MRC): MRC was established in 1879 to facilitate improvement of the Mississippi River. The law called for MRC membership to consist of three U.S. Army Corps of Engineers officers, one member of the NOAA (formerly the Coast and Geodetic Survey), and three civilians, two of whom must be civil engineers. For over the past 30 years a member of the NOAA Commissioned Corps has been nominated by the United States President and confirmed by the Senate as a member of the MRC. The MRC is responsible for developing plans to improve thecondition of the Mississippi River, foster navigation, promote commerce, and prevent destructive floods.

- NOAA Dive Training: For almost fifty years, the NOAA Diving Program (NDP) and its predecessors have been actively involved in conducting and promoting undersea research. Not surprisingly, many of the lessons learned and technologies developed by the NDP have been adopted by the recreational, scientific, and military diving communities, thus benefiting divers everywhere. Many of the decompression tables and training, operational and safety standards developed by the NDP have become worldwide standards.

- OMAO assists with extensive sensor research and development in close collaboration with other LOs and agencies within the federal government, and ensures the transfer of the new technology into operations. Past projects OMAO supported include sensors that have improved NOAA's understanding of the physical processes that drive intensity change within all stages of a Tropical Cyclone.

- OMAO developed Scientific Computer System (SCS), which integrates data from shipboard and deployed sensors into one central system. The SCS system collects and processes the incoming sensor data; both archiving and making the data available to scientists for real-time manipulation and processing. The ability of the SCS to integrate and display both raw and processed information is vital to safe navigation and other scientific applications that meet NOAA's objectives. OMAO shares this tool, at no charge, with both national and international organizations.

Educational Activities:

- Teacher at Sea & Air: Since 1990, the Teacher at Sea program has given teachers, from kindergarten through college, hands-on research experience aboard NOAA hydrographic survey and oceanographic and fisheries research ships. In 2004, a companion program was initiated to enable teacher participants to observe research activities and interact with scientists while on board NOAA aircraft. Since its inception the program has enabled more than 600 teachers to gain first-hand experience of science and life at sea and in the air. NOAA's Teacher at Sea & Air program's goals support NOAA's environmental literacy, outreach, and education goals and also support NOAA's workforce goals to recruit and retain a highly adaptable, technically competent and diverse workforce.

- Ship/Aircraft Tours: NOAA Corps Officers and crew offer opportunities for public and youth education, engagement, and outreach through ship and aircraft tours.

Social Science Gaps

OMAO does not have any social science gaps, outside an existing gap for socioeconomic analysis support. Currently, NOAA's program requirements far exceed the ability of new technology or the current NOAA fleet capacity to meet burgeoning needs. The lack of resources compounded with an increased emphasis on government efficiency requires agencies to demonstrate that resources are spent in the most effective and efficient way. Conducting socioeconomic studies on the Fleet would:

- Improve the understanding of OMAO and its relationship to their stakeholder and their requirements,
- Inform decisions regarding the optimal allocation of resources among programs, and
- Advance recognition of the contributions of OMAO.

OMAO does not have an in-house economist and does not have the workload to establish a fulltime position (FTE). In the past, socioeconomic studies relating to OMAO were either contracted or supported by a NOAA program with economist staff support. Most recently, OMAO participated in a socioeconomics study to value "Ocean Infrastructure". The lead economist for this study was provided by the NOAA Line Office, Program, Planning and Integration (PPI).

During FY13, OMAO plans to revise this study, incorporating all OMAO activities, to understand its role within the agency and its value to NOAA programs and the nation. In order to complete this study without the requisite in-house staff, OMAO would need to leverage in-house capacity from another line office or fund contract to bridge the resource gap.

Many of OMAO core activities could benefit by social science methods. For example, social science methods and information could be used to improve emergency response-related products, services and capabilities, or to inform homeland security and emergency response-related plans and activities in terms of fully understanding community's security and response-related needs. However, due to OMAO's business model as a service organization, any gap associated with the

social science need would be articulated by the LO or external organization (ie: DHS) with the legislatively mandated mission requirement.

Fully Operational Social Science

OMAO supports the development of a Chief Economist within NOAA. A Chief Economist at the agency level is essential to undertake NOAA-wide analysis to understand holistically how NOAA's products and services affect society.

Implications for Social Science

OMAO does not have a social science position or workload to support a full time Economist. As an organization that derives its operational requirements from the requirements of the agency, it is critical that OMAO's and NOAA's socio-economic impacts are derived aggregated economic impact estimates across the various NOAA programs. In order to facilitate a study with this enterprise level view, it is recommended that an economist reside within corporate NOAA, or PPI, to conduct the requisite analysis on agency wide socio-economic issues.

NOAA Headquarters

The following offices in Headquarters had the opportunity to review and comment on this document: Policy, Education, Legal Affairs, External Affairs, Communications, Department of the Undersecretary, and International Affairs. Two offices responded with specific comments to the requested questions; this document represents primarily input from the Offices of Policy and Education.

Headquarters Summary

There are a variety of offices within NOAA Headquarters that all are driven to fulfill different mandates and therefore have different social science needs. This joint response gives examples of how different offices downtown use and need social science to fulfill their missions. The key points from this Headquarters Social Science Needs Assessment are the following:

Capabilities

There is currently minimal social science capacity (as defined by the NOAA SAB) in-house at Headquarters, however, some offices do have money to contract out some social science via grants or contracts. But many offices are dependent on the social science coming from Line Offices to support their needs at Headquarters.

Needs

Better data to assess the societal benefits of NOAA's work will benefit many offices at Headquarters facilitating (1) better planning, (2) improved communication with partners, Congress, and the public, (3) augmented outreach and education, and (4) enhanced alignment of NOAA's programs with White House priorities.

Gaps

The main gaps in current social science at NOAA that would better support Headquarters include:

- Improved understanding of the relationship between education, educational tools, and stewardship.
- Better comprehension of the users of NOAA products (behaviors and vulnerabilities) and improved valuation of NOAA products and services (economic benefits generated from the use of NOAA products) which would help NOAA prioritize resource expenditures and ensure that the products and services provided are the ones that are most useful to users.
- Additional assessment of the value of NOAA's contribution to the nation's economic, social, and environmental needs.

Ideal Scenario

Headquarters would find it useful to have a NOAA "Social Science Center of Excellence" which would include individuals with scholastic degrees in the social sciences, but with expertise or knowledge in the climate, weather and water arena. This Center would interface with NOAA programs and provide social science analyses, develop supporting data, conduct applied studies and oversee consultant studies. This Center would have, at a minimum, a Risk Communication Specialist to be able to help NOAA more effectively articulate risk, vulnerability and uncertainty in its products, information and services, and an Economist to help direct and undertake economic valuation studies.

Social Science Mandates and Drivers

Education

Legal Mandates

- America COMPETES Act:
  - (b) Educational Program Goals- The education programs developed by NOAA shall, to the extent applicable--
    - (1) carry out and support research based programs and activities designed to increase student interest and participation in STEM;

Policy Office

The NOAA Policy Office does not have any particular organizational mandates that require social science inputs; however, we are often tasked with analyses to support information for the Office of the Secretary and the White House that would benefit from social science information. For example, it would be extremely helpful to have information about the economic and sociological impacts of NOAA's work to help make the case for how our programs support current priorities on job creation and economic development.

Strategic Documents

- The NOAA Education Strategic Plan, 2009 – 2029
  - Outcome 1: NOAA education programs are developed and refined using the best available research on the effectiveness of environmental and science education.

Current Social Science Capability

Education

In-house capability

- The Office of Education budget for evaluation is about $130 - 150k per year. This supports one full time evaluator and a second evaluator that we work with part time, both on contract.

External capability

- $1.49 million in grant awards to *The Ocean Project* to conduct and analyze public opinion polls on ocean issues.

- Grants totaling $517k to a team for a National Environmental Literacy Assessment of middle school students in the U.S.

- Contract with Institute for Learning Innovation to evaluate learning associated with the Science on a Sphere network.

Policy Office

While some employees in the Policy Office have some social science training, no one is exclusively focused on social science as part of their scope of work.
The Policy Office does not have a budget to contract out for external expertise.

Partnerships

The Policy Office relies primarily on the Line Offices for social science. While we do not proactively work with external partners to fulfill social science needs, we often find the products of external partners, such as universities and NGOs, extremely useful in terms of providing social science data and statistics to support our work.

Interagency Social Science

Education

- National Environmental Literacy Assessment was jointly funded by EPA and NOAA.

Policy Office

The Policy Office is involved in numerous interagency working groups. While not all of them are focused on social science exclusively, many could benefit from more social science analyses.

Social Science Needs

Process, Products and Activities that Require Social Science

Education

Education Council is using social sciences to assess current state of knowledge, evaluate program effectiveness, design programs, and develop performance metrics.

Policy Office

For the Policy Office, social science helps to better understand and quantify the societal and economic benefits that environmental information brings to the Nation. Clearly articulating and justifying the societal benefits will allow NOAA to:

- Plan better programs
- Communicate the return on investment to Congress, partners, and the general public
- Measure outcomes and improve performance within the organization
- Set targets for future accomplishments
- Prioritize investments to improve products and services
- Better align NOAA programs with DOC and White House priorities

Specifically, information collected from social science research informs messages, talking points, briefing papers, etc. that are written by the Policy Office. This information may also be used to consider areas to encourage more agency/ leadership focus, help advocate for additional resources (working with the budget office), or encourage partnerships with other agencies or external groups.

Gaps based on immediate risks

Education

- Develop and validate environmental literacy assessment tools.
- Research on link between education and stewardship.

Policy Office

The lack of social science available throughout the agency limits the Policy Office's ability to:

• Articulate the value of products and services delivered or ability to ensure its resources are allocated optimally across programs and objectives.
• Articulate NOAA's contribution to the nation's economic, social, and environmental needs.
• Understand the vulnerabilities and behavior (adaptation, risk perception) of the users of NOAA products/information, and the economic risks mitigated and value generated by these uses.
• Ascertain whether NOAA is designing and delivering products and services to best match the needs of its constituents.

Succinct summary information of key findings, statistics, etc from social science research (compiled in an easy to use location) is extremely helpful. There is some useful information on the www.ppi.noaa.gov/economics/ site and the NOAA Economic Statistics report, but additional information would be useful, in particular on the ocean and coastal side (ecosystem services of protected areas, recreation benefits, benefits of coastal management, etc).

Fully Operational Social Science

Education

Given the limited ability to hire in the current fiscal climate, NOAA should contract with outside experts to conduct studies and develop useful products.

Policy Office

Cadre of Social Scientists/Center of Excellence: A long term goal for successful integration of social science into NOAA products and services should include the development, over time, of a connected "center of excellence" populated by individuals with scholastic degrees in the social sciences, but with expertise or knowledge in the climate, weather and water arena. The intent is for these individuals to interface with NOAA programs and provide social science analyses, develop supporting data, conduct applied studies and oversee consultant studies. At a minimum, NOAA should have a Risk Communication Specialist to be able to help NOAA more effectively articulate risk, vulnerability and uncertainty in its products, information and service and an Economist to help direct and undertake economic valuation studies. This Center of Excellence would be invaluable for NOAA Policy to rely on for our information needs.

Appendix C
NOAA's Federal Social Science Workforce

NOAA's Social Science Federal Workforce.

NOAA's social science capacity resides in its federal employees and contractors, as well as its partners in the public and private sectors. Unfortunately, a centralized source of information exists only for NOAA's federal workforce. For the purposes of this assessment, Fiscal Year 2011 data was obtained from NOAA's Workforce Management Office in an attempt to better understand, in general terms, how the federal workforce contributes to social science capacity and to a culture of understanding the dynamic between NOAA's work and society. There are two categories available for these data that one can consider when examining this aspect of social science capacity: those in social science job series, and those who have social science educational backgrounds. A third category is also pertinent, those who are not in social science job series but who contribute to social science projects or issues, and while these persons could not be identified in the workforce management data, they are included in the discussion of in-house capacity (above). Finally, it is also important to note that although someone is in a social science job series, this does not necessarily mean that they are working on social science projects or issues.

For the reasons described above, the workforce data alone do not provide a complete picture of NOAA's social science capacity; however they do provide a starting point for discussion. For a more complete, if qualitative, assessment of social science capacity in each LO the reader should refer to the individual LO sections in Appendix B. The following is a snapshot of how the federal workforce contributes in general terms.

Social Science Job Series

NOAA had 95 federal employees (less than one percent of NOAA's federal workforce) in social science job series in Fiscal Year 2011 (see Figure 4). These include jobs in the "Social Science, Psychology and Welfare Group" in the Position Classification for White Collar Occupational Groups and Series[12]. This group also includes job series related to psychology and welfare that were not included in these data. These positions were dominated by economists who comprised 69 percent of the employees in this series (66 employees). Economists were followed by social science specialists at 20 percent (19 employees), geographers at six percent (six employees), and historians at three percent (three employees). There is also one archeologist.

[12] For more information, see the Handbook of Occupational Groups and Families from the U.S. Office of Personnel Management, which can be found at http://www.opm.gov/fedclass/gshbkocc.pdf

Figure 3: Relative Size of Federal Social Science FTEs in NOAA

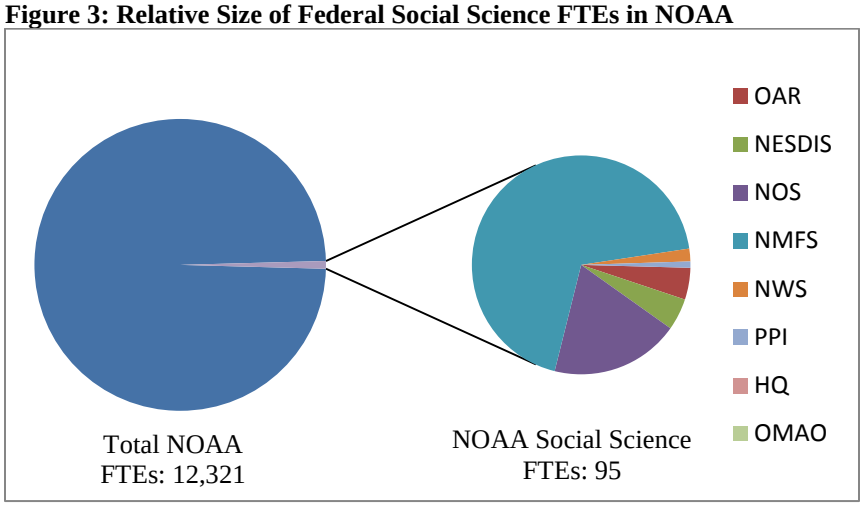
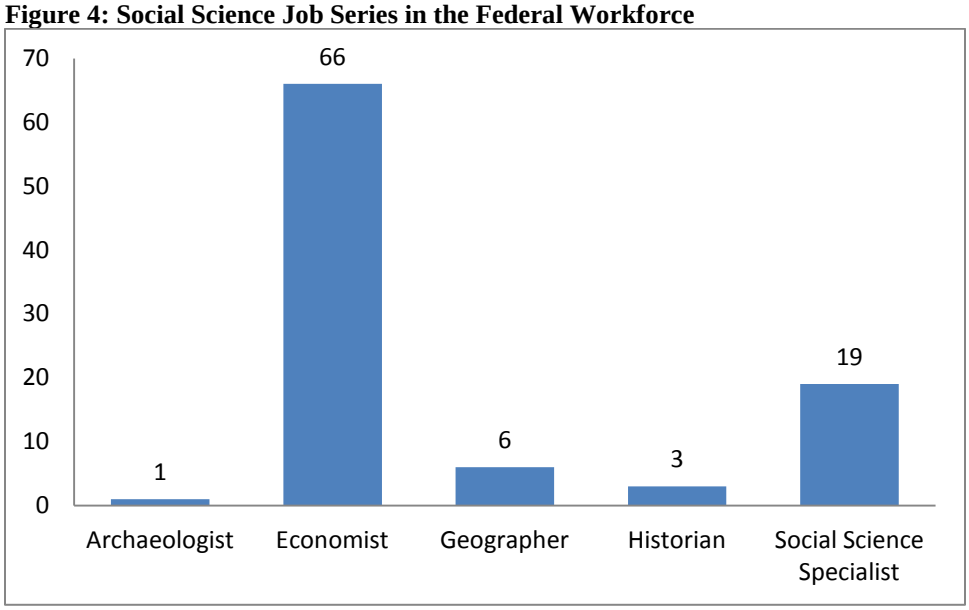
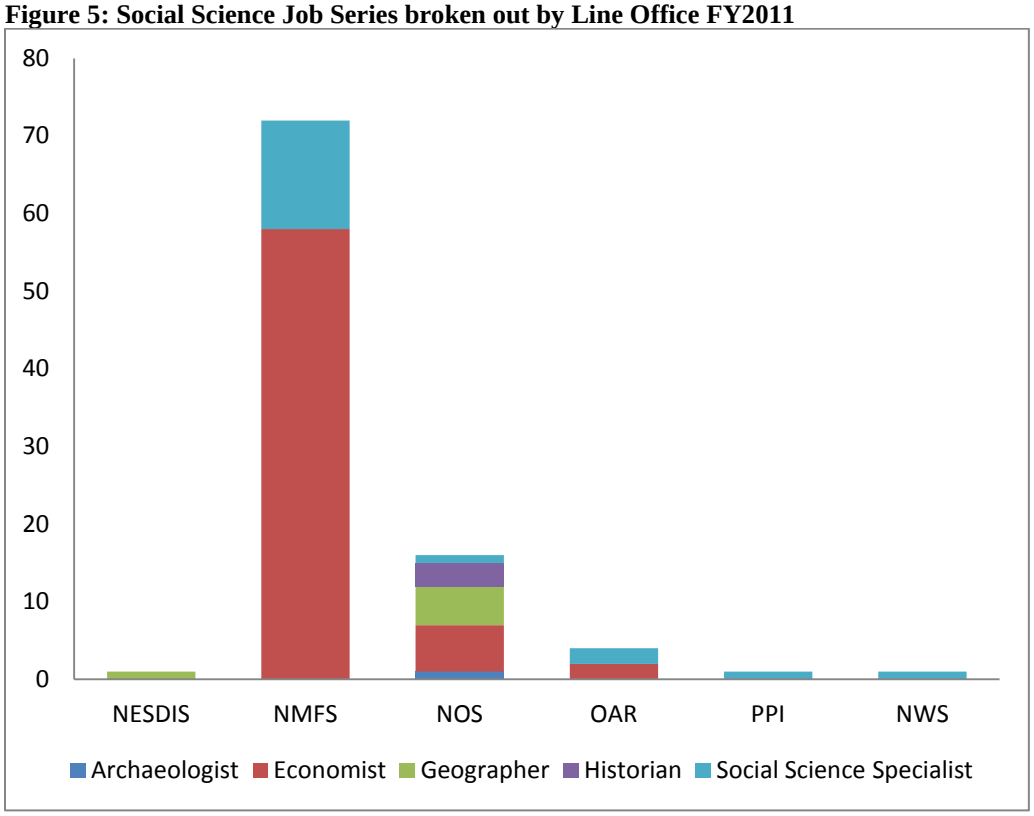


Figure 4: Social Science Job Series in the Federal Workforce



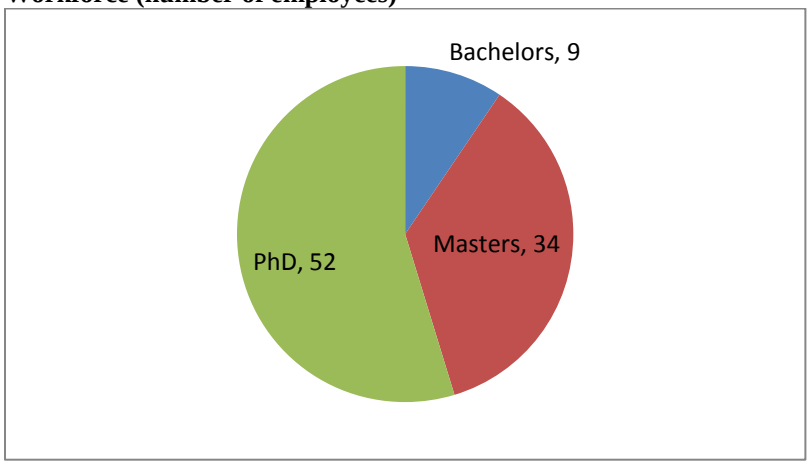
Line Office. During Fiscal Year 2011, 72 of the federal employees in social science job series, were employed by NMFS, including 58 economists, and 14 social science specialists. Of the 16 federal employees in social science job series in NOS, there was one archeologist, six economists, five geographers, three historians, and one social science specialist. OAR has four federal employees in social science job series, including two economists and two social science specialists. NESDIS, NWS and PPI each have one federal employee in a social science job series. NESDIS has one geographer, NWS has one social science specialist, and PPI has one social science specialist (although PPI traditionally has a position for Chief Economist, which is currently unfilled and not included here). See Figure 5 for details.

Figure 5: Social Science Job Series broken out by Line Office FY2011



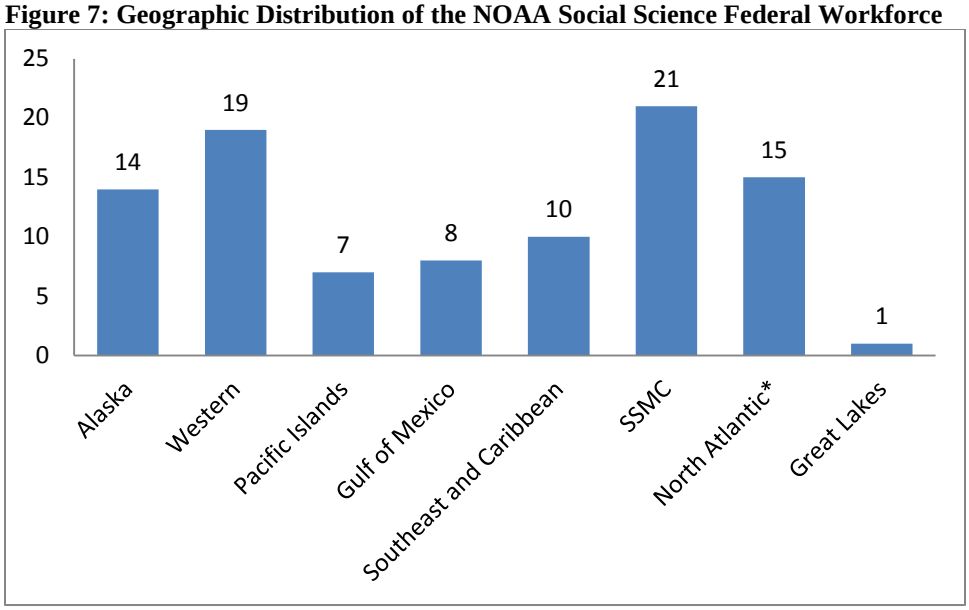
Education Level. In order to work as a social scientist, there is an assumption that an advanced degree is required. The workforce management data confirms this assumption. Of the federal employees in social science job series in FY 11, over half (55%) had a PhD (52 employees), thirty six percent (34 employees) had a masters degree, and nine percent (nine employees) had a bachelors degree.

Figure 6: Education Level of the NOAA Social Science Federal Workforce (number of employees)



Geographic Distribution. Historically, a challenge to organizing social science at the agency has been due to the fact that social scientists are distributed across the country, with many serving NMFS needs at regional fisheries science centers; or in NOS's Coastal Services Center or National Centers for Coastal Ocean Science. The use of the internet and email has made it easier for these widely distributed social scientists to work together. The geographic distribution of the federal workforce can be seen below (Figure 7). Note that those employees in the Silver Spring Metro Center (SSMC) have been taken out of the North Atlantic Region. Aside from those employees, the greatest concentration of federal employees in a social science job series is in the Western Region, followed by the North Atlantic (minus SSMC), the Alaska Region, the Southeast and Caribbean. The remainder of the regions had less than 10 employees in social science job series.

Figure 7: Geographic Distribution of the NOAA Social Science Federal Workforce

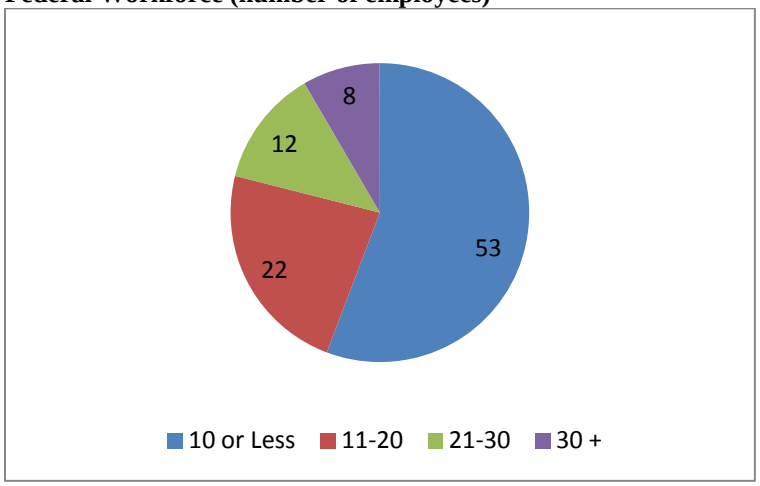


* North Atlantic without SSMC, which is represented as a separate category.

Experience. Social science experience has grown over the last decade. As can be seen in Figure 8 (below), the federal social science workforce in NOAA had more employees with 10 years of experience[13] or less than in any other range of experience. Of the ninety-five federal employees in social science job series, over half (53 employees) have 10 years or less on the job. From here the percentage goes down for each 10 year range of experience; to 22 (23 percent) for those with 11-20 years of experience, 12 (13 percent) for those with 21-30 years of experience, and 8 (eight percent) for those with over 30 years of experience.

[13] In this context, experience refers to years of working as a social scientist in NOAA.

Figure 8: Experience (in years of service) of the Social Science Federal Workforce (number of employees)



Social Science Educational Background[14]

A focus solely on social science job series underestimates the role that social science thinking has at the agency. While NOAA often is rightly perceived as an agency of scientists and engineers, many managerial and leadership positions are held by those with social science training. In FY 2011, there were 603 federal employees at NOAA (about five percent of the NOAA federal workforce) who had degrees in social science disciplines (see Table 2 for disciplines considered). As was noted above, employees with social science educational backgrounds are not necessarily engaged in, or supporting social science research or activities. However, there are a large number of federal employees who have been trained in a social science discipline, and who may contribute toward a "social science culture" in NOAA. These employees were identified through a review of the "academic discipline description" data element in the NOAA Workforce Management database. In the identification of these employees, a fairly inclusive discipline list was used to better determine the breadth of those with social science in their educational background. The academic disciplines used included those in Table 2.

Table 2: Academic Disciplines included in the Criteria for Social Science Educational Background

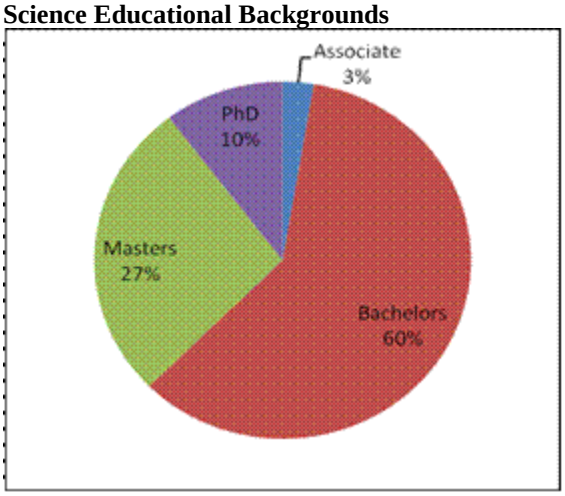
Agricultural Business and Mgmt, General	International Economics
Agricultural Economics	International Relations and Affairs
American Government and Politics	Multi/Interdisciplinary Studies, Other
Anthropology	Organizational Behavior Studies
Applied and Resource Economics	Parks, Recreation and Leisure Stud, Oth
Archeology	Parks, Recreation and Leisure Studies
Business Quantitative Methods and Mgmt	Political Science, General

[14] This information only pertains to federal employees. This does not represent the other categories of social science capability in NOAA.

Business/Managerial Economics	Psychology, General
City/Urban, Comm and Regional Planning	Psychology, Other
Criminology	Social Psychology
Demography/Population Studies	Social Science Teacher Education
Devel Economics and Internatl Devel	Social Sciences and History, Other
Econometrics and Quantitative Economics	Social Sciences, General
Economics, General	Social Studies Teacher Education
Economics, Other	Sociology
Geography	Travel-Tourism Management
History and Phil. of Science and Tech	Urban Affairs/Studies
History, General	Wildlife and Wildlands Management
International Business	

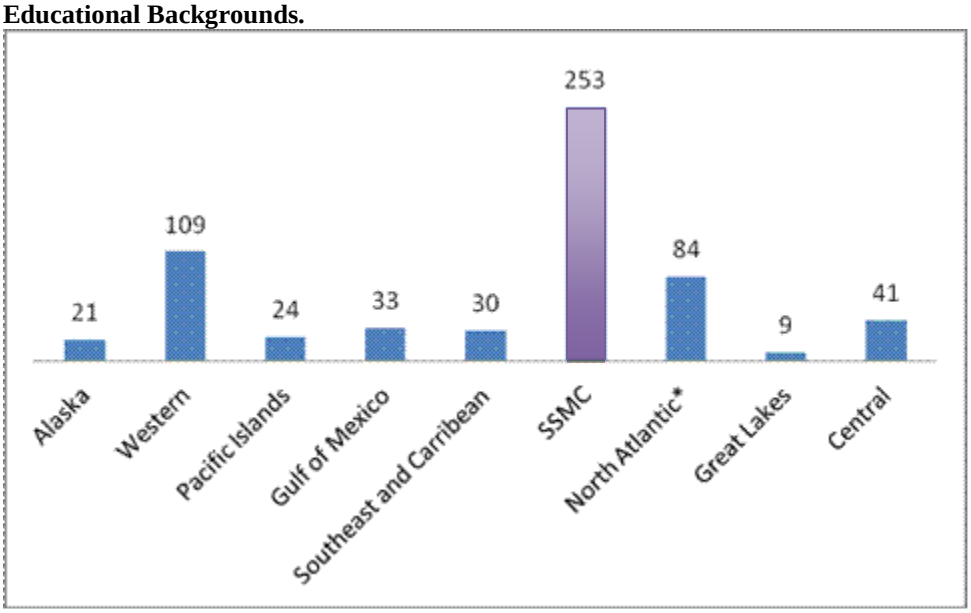
Education Level. Of the 603 federal employees who had degrees in social science disciplines, 16 (three percent) had associates degrees, 361 (sixty percent) had bachelors degrees, 164 (27 percent) had masters degrees and 62 (10 percent) had PhDs. From this you can see there were significantly more employees with masters degrees and higher in social science job *series* as compared with those that had *educational backgrounds* in social science (91 percent versus 37 percent, respectively). This does make sense, as advance degrees are more necessary for those conducting social science research and providing technical assistance, than for those who are in non-scientific job series.

Figure 9: Education levels of those with Social Science Educational Backgrounds



Geographic Distribution. Of the NOAA federal employees who have an education background in social science (Figure 10), the greatest number (253) work at the NOAA Silver Spring, MD Metro Campus (SSMC) (42 percent). (Further evidence that those with social science degrees are active in management at the agency.) After SSMC, the next NOAA region with the largest number of employees is the Western region (109 employees or 18 percent), followed by the North Atlantic Region (minus SSMC) with 84 employees (14 percent), and the Central Region with 41 employees (seven percent). The remaining regions each had five percent or less of the total.

Figure 10: Geographic Distribution of federal Employees with Social Science Educational Backgrounds.



* This is the North Atlantic Region with the Silver Spring Metro Campus removed.