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ON THE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S (NOAA) PROPOSED REORGANIZATION TO CREATE A CLIMATE SERVICE LINE OFFICE AS PRESENTED IN THE PRESIDENT'S FY 2012 BUDGET

BEFORE THE
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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Chairman Hall, Ranking Member Johnson, and members of the Committee, before I begin my testimony I would like to thank you for the leadership, interest, and support that you have shown the National Oceanic and Atmospheric Administration (NOAA), one of the Nation's premier Earth science and service agencies. I am honored to be here as the Under Secretary of Commerce for Oceans and Atmosphere at NOAA to discuss the proposed reorganization that was included in the President's Fiscal Year (FY) 2012 budget. This proposal would strengthen science across the agency, increase organizational efficiencies, and create a new Climate Service Line Office at NOAA - to allow us to better meet the growing demand for climate information and services on climatic conditions and long term forecasts that are vital to America's businesses and communities. I would like to emphasize upfront that this reorganization is a proposal, and NOAA has not created a new Line Office.

Summary

NOAA's short term weather forecasts of conditions on an hourly basis to about two weeks out are a key component of our mission to protect American lives and property. Likewise, NOAA's long range weather and seasonal forecasts, also known as climate forecasts, inform advance planning decisions, from weeks to months ahead of time, that allow for a rapid response to the onset of events such as severe storms, droughts, and floods.

Although many people think very long term when they hear the word 'climate,' climate simply picks up where weather leaves off. "Climate services" refer to forecasts of conditions any time in the future beyond two weeks. For more than a century, NOAA has provided information about the weather, by way of short term forecasts of less than two weeks, and about the climate through long-range forecasts from two weeks to seasons or years out. For example, NOAA's climate forecasts, including seasonal precipitation and drought outlooks, are helping firefighters in Texas prepare for and respond to this record wildfire season. These data and products are not just critical to Americans when it comes to saving lives and property; NOAA's information is

being used by businesses, industry, and governments to make smart investments in the economy and infrastructure. For example, just one of NOAA's information tools is helping the U.S. home building industry save an estimated $300 million per year in construction costs alone, by using NOAA's temperature trend information to design cost-effective building foundations.

Americans also depend on NOAA's climate information to reduce their risk to natural hazards (such as drought and flooding) and to take advantage of opportunities to use scarce resources more efficiently (such as reducing irrigation schedules during periods of above normal precipitation). And they are now demanding more data and increasingly complex products in a timely manner that, in turn, requires advanced scientific study. Appendix A of this testimony provides examples of the impressive growth in demand for NOAA's climate service, as well as additional examples of the types of services and data requests NOAA receives.

NOAA cannot meet the Nation's increased demand for this information with our current organizational structure. Our core climate science, information, and service activities are distributed across multiple line offices and therein inhibit our ability to efficiently target and deploy our resources and efforts. To address these administrative inefficiencies, the Department of Commerce and NOAA proposed an internal agency reorganization to consolidate the management of our climate related programs, laboratories and centers in a new NOAA Climate Service. Appendix B outlines the extensive criteria used to evaluate the various options for organizational structure of a climate service within NOAA, and reviews the analysis of the various options not selected. This effort was initiated under George W. Bush's Administration, and it has been highly vetted by a diverse array of organizational experts, scientists, NOAA's own Science Advisory Board (SAB), and, at the request of Congress, the National Academy of Public Administration (NAPA).

The Climate Service Line Office at NOAA would be a single point of contact in NOAA to provide credible, useful, and timely information products. It would work with the broader climate service enterprise, including other Federal, state, and local government agencies, the academic community, and the private sector to provide businesses, communities, and resource managers with services and information for decision-making. The proposed Climate Service Line Office at NOAA would improve NOAA's organization, such that the agency can be a more accessible, transparent, and collaborative partner to achieve the agency's climate goals and to ensure that all Americans' needs for climate information are met. In doing so, NOAA's reorganization would also support economic innovation and entrepreneurship. This includes supporting development of the private sector climate services industry emerging around NOAA's climate information, in much the same way that the roughly $1+ billion private sector weather industry has grown up around NOAA's weather data and services. Please see Appendix C for a description of the many benefits the proposed Climate Service Line Office at NOAA would provide.

A cornerstone of this reorganization is strengthening the Office of Oceanic and Atmospheric Research (OAR) and NOAA science more broadly to advance our scientific understanding and develop new technology to support NOAA's mission and services. NOAA's proposal embraces the highest standards of scientific excellence and integrity. In doing so, our proposed reorganization would preserve, strengthen and integrate the existing solid foundation of science

across the agency, advance innovative and transformational research and development, and incubate solutions to NOAA's next grand science challenges. I know this is an issue on which the Committee shares our strong commitment and we are grateful for your support. We look forward to working with the Committee to continue to advance NOAA's mission-focused science enterprise as we move forward.

The proposed reorganization is good government. It comes at no additional cost to the American taxpayer, and would sustain NOAA's scientific research capabilities and focus them on these new challenges. In short, Americans are demanding more and better products to help them prepare for severe weather events and other hazards, and NOAA is proposing to more efficiently use the resources we receive to advance our science and improve our delivery of services to the public.

Climate, Weather, and Service Products

The Nation has relied on climate information and services for decades, in the same way we have relied on weather information (like severe weather forecasts and warnings) and other weather services. Throughout history, as well as today, people around the country and the world use climate information to minimize risks and maximize opportunities across a diversity of sectors. Weather information is short-term, provided in hourly to roughly two week forecasts. Many think of climate as far into the future, but in fact, climate picks up where weather leaves off at about the two week mark. Climate services, like weather services but on a longer time-scale, generally from two weeks out to seasons and beyond, are rooted in historical records of temperature, precipitation, storms, sea level, ice coverage, and related oceanic and atmospheric processes. Climate services are easily accessible and timely scientific data and information about the climate that help people make informed decisions in their lives, businesses, and communities. For decades, NOAA has been at the forefront of advancing climate science and delivering climate information products. Specific examples of NOAA's climate products include:

- Seasonal Atlantic and Pacific basin hurricane outlooks
- Seasonal Outlooks (3-month) for precipitation and temperature
- Seasonal to weekly drought outlooks
- Monthly U.S. and global climate summaries
- Annual State of the Climate reports
- Annual Arctic Report Card updates
- Sea Level Rise predictions
- Climate projections and scenarios about future climate conditions

As NOAA's climate science and services continue to mature, we should be better able to keep people out of harm's way, and enable them to plan for their communities' future and make smart business investments.

The Overarching Goals of the Reorganization Proposal

In the President's FY 2012 budget to Congress, the Secretary of Commerce proposed a budget-neutral reorganization of NOAA to improve its ability to provide Americans with information and services that will help them prepare for natural hazards and to make informed decisions.

The proposal outlines two major objectives essential to achieving this goal: (1) improve NOAA's ability to efficiently and effectively respond to the Nation's increasing demands for climate information, consistent with the Department of Commerce's (DOC) authority under the National Climate Program Act (15 U.S.C. §2901, *et seq.*); and (2) strategically renew and strengthen the agenda of the Office of Oceanic and Atmospheric Research's (OAR), NOAA's core research organization, making it a forward-looking charge to —incubate solutions to long-term science challenges, integrate an agency-wide science portfolio, and drive science and technology innovation. The reorganization would allow NOAA to better execute its mission, legislative mandates, and funding in a more effective, and transparent manner. It would consolidate NOAA's existing, widely dispersed, climate capabilities under a single Line Office management structure to better organize NOAA to respond to the Nation's rapidly increasing demand for climate information and services.

This strategic alignment of climate assets will allow NOAA to improve its ability to provide the reliable and authoritative climate data, information, and decision-support services that Americans seek through a centralized, coherent, unified structure that will better facilitate coordination with other federal, state, local, and tribal partners. NOAA recognizes that no one federal agency, nor the federal government alone, can meet the Nation's need for climate science and services. This proposal would improve NOAA's organization such that the agency can be a more accessible, transparent, and collaborative partner. NOAA will continue to rely on governmental, academic, and private sector partnerships to ensure that all Americans' needs for climate information are met.

We are not requesting an increase in funds to implement this proposed organizational change. Equally important, the proposal does not move resources away from non-climate programs in OAR, or other NOAA offices or programs, to fund the Climate Service Line Office at NOAA. We are simply proposing to use existing climate-related funds and assets more effectively. In the same way, none of NOAA's climate or other research capabilities is diminished by the proposed reorganization. In fact, the proposal would free OAR to renew its focus on other innovative long-term research priorities across the agency, much as it has focused on and matured climate science over the past four decades, bringing it to the point that it is now ready to be more closely aligned with services. Furthermore, we do not propose any fundamental change to the balance of internal versus extramural funding, pending Congressional appropriation. Much like you would tune up your car's engine to obtain better performance, we are proposing to "tune up" our agency so we can better meet our Congressional mandates to provide Americans with climate information for smart decision-making.

<u>Scope and Demand for NOAA's Climate Services</u>

Few environmental factors affect our economy, ecosystems, and livelihoods more than weather and climate. Severe weather and climatic extremes pose risks to human health, safety and property. Apart from the extremes, everyone understands the influence of weather on everyday life. Will it be hot or cold, windy or calm? Do I need an umbrella? Just as weather affects our daily decisions, so too does climate. Can farmers in Northeastern Minnesota grow soybeans on their farms? How far from the Mississippi River or the Gulf Coast should houses be built? Will there be enough water to support the anticipated growth in Atlanta's suburbs 20 years from now? Information about climate conditions is essential to smart planning, and to create better prepared

and more resilient businesses and communities. NOAA's climate capabilities have matured significantly and grown in sophistication over the past 40 years. Today, more Americans depend upon this essential information to make decisions than ever before. The public is now demanding more data and increasingly complex products at scales that are relevant to them. Detailed accounts of the volume and scope of requests for NOAA's climate service products are provided in Appendix A.

Creating Opportunities for the Private Sector

NOAA's climate services are supporting the growth of a new category of economic, scientific and technology innovation: entrepreneurs and businesses that specialize in the provision of tailored climate services and products that support specific users. This emerging private sector climate service industry utilizes information and products generated by the public sector, adds value, and markets them to businesses and the public in much the same way as the existing private sector weather services industry. For example, private sector service providers use NOAA's long-term temperature and precipitation records to develop tailored products to help the energy sector plan for electricity demand and water availability. An explicit goal of the proposed Climate Service Line Office at NOAA is sustained engagement with the private sector to ensure that all of NOAA's climate data and products are easily accessible and supporting the development of this emerging market with tremendous growth potential. A roughly billion-dollar private sector weather industry has grown up around NOAA's weather services, and it is expected that a similar private sector climate industry will emerge in coordination with NOAA's climate services.

History of NOAA's Climate Services and Existing Congressional Authorization

One of NOAA's longest and proudest legacies is that of being a leader in the field of climate science and service delivery. NOAA maintains the official U.S. and global climate data record, produces operational seasonal forecasts that include drought and flood outlooks, maintains the longest continuous data record of carbon dioxide measurements, and operates more than 50 percent of global ocean observation platforms, as well as other environmental sensors that span the globe. We have Nobel Prize-winning scientists who collaborate with peers from around the world to advance our knowledge of the planet's ever changing climate system using data from observations and models.

In 1978, Congress had the foresight to see that climate information was important to the Nation, and officially passed the National Climate Program Act, which stated, "It is the purpose of the Congress in this Act to establish a national climate program that will assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications." This legislation also recognized NOAA's role, within the Department of Commerce, as the leading provider of climate information and services. With this charge from Congress, NOAA has been actively working to help society understand, plan for, and respond to climate variability and change. NOAA is committed to providing a suite of relevant climate science and services to help governments, businesses, and communities to manage their risks and take advantage of new opportunities. NOAA's climate capabilities are focused in core areas:

- Climate Observations and Monitoring to describe and understand the state of the climate system through integrated observations, monitoring, data stewardship;
- Climate Research and Modeling to understand and predict climate variability and change in timeframes ranging from weeks to a century; and,
- Climate Information Services to improve society's ability to plan and respond to climate variability and climate change.

Congress, and this Committee, have long recognized NOAA's leadership and capacities in the development and delivery of climate science and services. The Global Climate Change Research Act, the National Climate Program Act, the National Weather Service Organic Act, and the National Integrated Drought Information System Act (NIDIS) not only underpin the strong federal interagency climate science enterprise that has advanced the U.S. and world's understanding of the Earth system, but also provide NOAA its foundational authorities to advance climate science and develop and deliver the climate services that serve the Nation. Over time, as our understanding of the climate system has improved, NOAA has worked with and alongside its partners to transition NOAA data into climate services that support a broad range of decision makers. NOAA's NIDIS program is an excellent example of how our environmental information services can be critical to local decision makers, farmers, ranchers, energy producers, resource managers and emergency responders. NIDIS demonstrates how our understanding of the climate system has advanced to the point where we can begin to develop regional climate services, and it holds repeated endorsements for the value of its services from a broad range of groups, including the Western Governors Association.

In its most recent recognition of NOAA's important role in climate science and services, Congress called for an expert panel of the National Academy of Public Administration (NAPA) to conduct a study of organizational options for the development of a Climate Service in NOAA.[1] The Panel of private and public sector business and administrative experts concluded that NOAA's assessment of user demand is accurate, but the business processes that NOAA has employed to meet this demand, including matrix management, were beneficial but largely inadequate. Next, they reviewed a broad range of organizational options specific to optimizing NOAA's ability to develop and deliver climate services. Ultimately, NAPA concluded that a Climate Service Line Office at NOAA would be needed for the agency to adequately respond to the increasing demand for climate information, and provided some valuable recommendations for its design and implementation.

Challenges of NOAA's Current Organization

Today, climate science and service capacities are distributed across five Line Offices at NOAA, resulting in bureaucratic inefficiencies, no clear access point to NOAA's climate information for users, and missed opportunities for synergies between scientific advances and fast-evolving services. Historically, this was less of a problem, as service development and delivery was less in-demand. However, growing demand for advanced climate services has highlighted the limitations of NOAA's current organizational structure. Scientific, industry, government and public concerns about natural hazards such as floods and drought are fueling the tremendous growth in the demand for climate related information from NOAA. All sectors of society are

[1] U.S. Congress, House, Conference Committee Report to Accompany Consolidated Appropriations Act, 2010 111th Congress, 1st Session, 2009, Report 111-366.

faced with the need to better understand and anticipate the impacts of climate variability and change in order to make more informed decisions and be competitive at home and abroad.

Existing Structure Is Unable to Keep Pace with Demand

Through our existing network of laboratories, data centers, programs, and operational assets distributed throughout the agency, NOAA responds to millions of annual requests for climate information. However, under our current distributed organizational structure for climate science and services, the rapidly-increasing user demand is outpacing NOAA's capacity to effectively deliver requested products and information and exceeding NOAA's ability to meet or be responsive to future needs.

NOAA stakeholders who want access to our information have expressed frustration that they do not know who to go to as we have too many points of entry for climate information. For example, although the Climate Prediction Center produces the seasonal forecasts, information on historical climate is kept at the National Climatic Data Centers. It is reasonable for a stakeholder to include seasonal predictions and trends in a single request to NOAA, but they currently need to go through two different Line Offices to get this information. As another example, coastal managers looking for information on sea level rise will need to work with the National Oceanographic Data Center in the National Environmental Satellite, Data and Information Service (NESDIS) to find the data, the Climate Program Office in OAR and the regional climate services director in the National Climatic Data Center for information on grants and partners, and our labs in OAR, including the Geophysical Fluid Dynamics Laboratory and the Earth System Research Laboratory, for the models that help us understand future sea level trends. The single point of entry that the Climate Service Line Office at NOAA will provide is obviously needed.

Numerous external studies, by NOAA's Science Advisory Board (SAB), the National Academies, NAPA and others have reiterated the Nation's demand for easy-to-find, reliable and understandable information and products about climate variability and change. A centralized Climate Service Line Office at NOAA will increase the agency's ability to anticipate, understand and provide the information Americans need to meet the challenge of being competitive and resilient in the climate of the future by incorporating relevant climate knowledge in their decision-making today.

A New Organizational Structure is Needed

Reorganizing NOAA's existing climate capabilities under a single Line Office will create a more integrated and efficient organization to better respond to these critical needs at the national and local level, and allow the agency to make key contributions in the development and delivery of climate science and services. Creating one office will establish a stronger position for NOAA to conduct its climate research, monitoring and assessment work in a coordinated fashion. It will also create a visible and easy to find, single point of entry for people to access NOAA's science and service assets; enable improved information sharing and more productive partnerships with federal agencies, local governments, private industry and other users and stakeholders; and, further increase transparency.

Since NOAA was established in 1970, its broad array of climate science and services has developed independently within each Line Office to meet each of their specific user needs and Congressional mandates. NOAA's existing framework for climate activities was established

before the potential of climate services was fully recognized and it is not optimized for efficient or coordinated climate service delivery. The oversight and management of this network of labs, centers and programs remains a decentralized and loosely organized enterprise. NAPA specifically addressed the issue of current cross line coordination efforts in their report. For the past eight years, NOAA has used a matrix management system to integrate climate activities across the agency. The NAPA review stated:

> The introduction of matrix management and the creation of the Climate Goal Team were thoughtful and significant investments to respond to demand by improving performance across NOAA's distributed network of climate activities. Matrix management has helped improve alignment across a range of activities and organizational stovepipes.

NOAA has maximized the use of matrix management, but the rising demand for climate services requires NOAA to take additional action. NAPA concluded:

> A major challenge of [NOAA's] Climate Goal Team has ultimately been its lack of consolidated management control of personnel and budgets….This has limited NOAA's ability to meet strategic climate objectives, and the agency has cited it as an important reason for why it proposed creation of a Climate Service.

NOAA has delivered science and services for decades, responds to thousands of direct requests per week, and serves data to tens of thousands of users per month via the internet; however, the reality is that NOAA must improve our information and service delivery in order to meet the rapidly increasing public demand in this area. We have every reason to expect that demand will continue to increase in the future as people, business and communities begin to more fully utilize environmental information, including climate forecasts, in their daily decision making.

Organizational structures have many virtues, and the major virtue NOAA will achieve here is accountability. During listening sessions and engagement activities across the Nation, across sectors, and across stakeholder groups, climate services is repeatedly raised as the number one area where people would like more from NOAA. However, despite this overwhelming demand and business case for our work, there is currently no position within NOAA that is accountable for the performance of our climate portfolio, resulting in *ad hoc* coordination and integration among dedicated NOAA employees who are willing and eager to step outside their traditional management boundaries to advance NOAA's climate science and services. As any business will tell you, however, this model has its limitations. Strong, focused leadership that is committed to executing a unified vision is central to any successful business. This is one of the key conclusions of the NAPA Panel, which was comprised not of climate scientists, but of business leaders and administrative experts who recognized this as NOAA's key challenge in growing our service delivery abilities.

How NOAA Arrived at the Reorganization Proposal

The idea of creating a Climate Service Line Office at NOAA is not new. The concept first surfaced in the early 1970s, not long after NOAA was established, and later gained prominence and traction in NOAA during the George W. Bush Administration. The Bush Administration turned the Nation's attention towards the need for a Climate Service entity within the federal government, and supported rooting its foundation within NOAA. Dr. John Marburger, President Bush's Chief Science Advisor, also supported the establishment of a Climate Service and wrote in a letter to the Honorable Senator Inouye that, "given its distinctive observational assets,

assessment and prediction capacity, and service delivery capabilities, the functions of a National Climate Service clearly require a leadership role for NOAA." Ultimately it was Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), the previous Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator under President George W. Bush, who first announced the agency's intent to create a Climate Service organization in NOAA.

Vice Admiral Lautenbacher made great advancements in promoting cross-Line Office integration within NOAA by implementing a matrix management system. Upon initiating matrix management, the Vice Admiral wrote in a NOAA memorandum that one of his first and highest priorities under that system was climate. Throughout the course of the previous Administration, the Vice Admiral oversaw a level of coordination on climate that has had an enduring benefit within NOAA and strengthened NOAA's climate science and services enterprise. However, over time the Bush Administration leadership recognized that matrix management alone was insufficient to ensure NOAA was positioned to support the Nation's climate service needs. Thus, in 2008, Administrator Lautenbacher announced his intent to establish a Climate Service Line Office in NOAA.

In addition, from 2008 to 2009 the NOAA SAB and its Climate Working Group (CWG) undertook an effort to compare and contrast specific options for the development of a National Climate Service – a broad enterprise of agencies, including NOAA, and organizations comprised of users, researchers and information providers. This effort resulted in the June 5, 2009, SAB report entitled *Options for Developing a National Climate Service.* The SAB's report concluded that each option had significant strengths and weaknesses and that no option was viewed as an ideal option for a National Climate Service. The report did not make specific recommendations as to how NOAA should reorganize its own internal climate capabilities. Among its findings, however, the SAB clearly stated, "The current NOAA organization is not well-suited to the development of a unified climate services function. Greater connectivity between weather and climate functions and between research, operations and users is required." Later, NAPA endorsed both this and the previous Administration's conclusions and decision to establish a climate service organization in NOAA. As noted above, NAPA agreed that the previous Administration made significant progress towards integrating NOAA's climate assets through matrix management. Ultimately, however, NAPA supported the assessment of both the previous and current administrations: matrix management alone is not sufficient to strategically align NOAA's assets towards our climate service objectives

Upon arriving at NOAA, I had the opportunity to continue to build on the large body of information and analysis that had been done on the issue of a climate service organization in NOAA. Ever since the previous Administration's decision to establish a Climate Service organization, NOAA and external groups have been engaged in efforts to further develop the specific design and implementation considerations for a Climate Service. NOAA has both been working internally to further scope out the concept, as well as externally to gather input from its partners, including federal, state and local agencies, Congress, business and industry, the academic community, and non-governmental organizations. NOAA has held dozens of roundtables with our partners and constituents to discuss their needs for climate services.

In addition, at Congress' request, NOAA commissioned NAPA to conduct the aforementioned study of organizational options for delivering climate services, which included its own extensive stakeholder and partner engagement process. Only after serious considerations and deliberations, a specific proposal was developed that outlined the NOAA programs that should be included in the Climate Service Line Office at NOAA.

Options Considered

There has been significant analysis and discussion both internal to NOAA and among external groups about the best organizational structure for a climate service in NOAA. The breadth of expertise and interests represented and the time that was afforded for these discussions was tremendously beneficial to the formulation of NOAA's proposed reorganization. DOC and NOAA have taken such discussions and the ideas they have generated very seriously. In response, NOAA has worked with some of the brightest minds on institutional planning and administration, service delivery, stakeholder involvement, and climate science to develop, evaluate and integrate the many ideas that have arisen from these discussions into the proposed reorganization contained in the President's FY 2012 Budget Request.

Under Vice Admiral Lautenbacher's leadership, NOAA worked with private sector management experts for two years to study NOAA's structure for climate activities. In addition, NOAA's internal management developed numerous strategy documents that have been the foundation of the work that has followed under my tenure. Prior to developing a suite of options to consider, NOAA set out several design principles for all reorganization options that would be considered. These principles, and the subsequent options evaluated were informed by the recommendations received from our SAB and a variety of other internal and external sources of input and advice. The specific principles NOAA set out to guide its development of options included the following:

- Although various programs and activities would be consolidated, renamed, and managed collectively, any reorganization could not initiate or create new programs or activities not provided for in NOAA's existing authorizations and appropriations;
- All realigned activities in the current year would continue to be funded at Congressionally directed levels;
- The reorganization would not increase or decrease the NOAA Full-Time Equivalent (FTE) or billet allocation, or require any relocation of employees;
- The reorganization would not require any physical relocation of programs or labs, or require any new facilities to accommodate this reorganization;
- Result in a zero sum realignment of funds within the current NOAA budget; and,
- Not increase the size of NOAA overhead.

Adhering to these principles, NOAA subsequently developed and analyzed four potential organizational structures to reorganize existing NOAA climate assets against a set of design criteria. All options considered were budget neutral, none grew the size of headquarters, and all had no impact on funding for NOAA's science portfolio. These options included : (a) consolidating major climate science and service assets in the National Weather Service, (b) consolidating major climate science and service assets in new Climate Service Line Office and eliminating OAR by moving its research into relevant Line Offices, (c) consolidating major

climate science and service assets in OAR, and (d) maintaining OAR and consolidating major climate science and service assets in a new Climate Service Line Office. More information on the design criteria and analysis of options that were not selected can be found in Appendix B.

NOAA's Proposal

After careful review against the design criteria outlined in Appendix B, and consideration of all input received, including from the SAB, NAPA and a breadth of internal and external experts, NOAA determined that the option that strengthens and maintains OAR while establishing a separate Climate Service Line Office was paramount. The proposal is equally focused on and committed to strengthening and integrating NOAA's science enterprise and advancing the vision of OAR. The establishment of a separate Climate Service Line Office and maintenance of OAR, as a research-focused Line Office had numerous benefits as compared to the other options. OAR will continue to serve as NOAA's centralized research Line Office, serving all of NOAA by supporting and producing preeminent research and technology innovation that advances NOAA's mission. Because high quality climate science is at the core of climate services, housing both climate science and services under one organizational structure will allow NOAA to better transition climate research findings into usable information and services that help businesses and communities make more informed economic decisions and safeguard lives and property. Since climate services are rapidly evolving, it is beneficial that the climate science and service development go hand in hand in order to develop products and services that can evolve and be initiated rapidly when needed in response to scientific information as it emerges. The continuous advancements in climate science demand a close proximity to the service, not only so that those advancements can constantly improve products (science push), but also so that the users can be asking new questions of the science (user pull). More information on the efficiencies that would be gained through this proposal and the benefits that would be produced can be found in Appendix C.

Under NOAA's proposal, the building blocks of the proposed Climate Service Line Office would be drawn from three existing NOAA Line Offices:

- From OAR: The Geophysical Fluid Dynamics Laboratory, the Climate Program Office, and from the Earth System Research Laboratory – the Chemical Sciences Division, the Global Monitoring Division, the Physical Sciences Division;
- From NESDIS: The three data centers - the National Climatic Data Center (NCDC), the National Oceanographic Data Center and the National Geophysical Data Center; and,
- From NWS: The Climate Prediction Center, and management responsibilities for climate observing networks including the Tropical Atmosphere Ocean (TAO) array and the modernization of the Historical Climate Network (HCN-m).

There will not be any programmatic changes to the National Ocean Service, the National Marine Fisheries Service, or the Office of Marine and Aviation Operations. It is important to point out that NOAA is aware that we must do more than simply reorganize our assets. For example, the nation is looking to NOAA for linkages between weather and climate, coasts and climate, and living marine resources and climate. This will require close working relationships between the new climate office and our other Line Offices, and although the Climate Service Line Office would take a leadership role, meeting these challenges effectively is a NOAA-wide endeavor.

The proposed Climate Service Line Office structure reflects NOAA's response to the needs of numerous demands for climate services, so that the agency can: (1) promote integration of NOAA's climate science and service assets; (2) heighten the accessibility and visibility of NOAA's climate services for our partners and users; and (3) allow NOAA to more efficiently address user and partner needs compared to our current distributed structure. To make this new organization successful, it will encompass a core set of longstanding NOAA capabilities with proven success, including climate observations, research, modeling, predictions and projections, assessments, and service delivery infrastructure. NOAA envisions the proposed Climate Service Line Office providing a single point of entry for people to access NOAA's information assets, and enabling improved information sharing and more productive partnerships with a broader enterprise that includes: federal agencies, local governments, private industry, other users, and stakeholders. To help realize this broader enterprise, NOAA is co-chairing (along with U.S Geological Survey and the Office of Science and Technology Policy) a Roundtable on Climate Information and Services under the auspices of the National Science and Technology Council.

NOAA's proposed reorganization also maintains the highest standards of scientific integrity for all NOAA science and seeks to strengthen and integrate science across the agency. Through the reorganization NOAA is seizing the opportunity to refocus OAR's efforts to incubate solutions to tomorrow's long-term science challenges, to integrate an agency-wide science portfolio, and to drive NOAA science and technology innovation. For example, OAR provides : the next–generation weather prediction and forecast tools, including the Multi-function Phased Array Radar (MPAR) that provides a data refresh every 43 seconds versus traditional radar refresh rates of every 3 minutes; new research platforms such as the dedicated *Okeanos Explorer* that help us better understand what is happening under the ocean; and an Earth System Prediction Capability that is a NOAA-wide planning effort to identify future needs for environmental predictions. Realigning OAR and strengthening science across the agency is a core component of the proposed reorganization.

To further ensure that NOAA's commitment to continuing to develop leading edge climate science is strengthened, a climate senior scientist position is included in the reorganization proposal. This position would ensure sound business practices wherein climate science informs, but does not prescribe, decision-making, and decision-making informs climate science, but does not prescribe research priorities. Additionally, this position will be key to ensuring the highest standards of data quality are employed for climate science and services.

In contrast to the NWS model, where science and service (or operations) are housed in separate Line Offices, NOAA does not envision a service delivery component for the Climate Service Line Office that is remotely near the scale of the NWS with its 122 local forecast offices and other regional infrastructure. In fact, the research and science component of the proposed Climate Service Line Office is expected to continue to be much larger than its services component, where NOAA intends to employ approaches leveraging outside assets. Within NOAA, we will continue leveraging the service delivery infrastructure of the NWS and other partners like the Regional Integrated Sciences and Assessments (RISAs), Regional Climate Centers, state climatologists, Sea Grant extension, Coastal Services Centers, National Marine Sanctuaries, and other parts of NOAA. Given the growing demands for climate information

from business, we are working with private sector companies that are providing climate information today or interested in developing this line of business. This latter approach is much akin to the relationship between the National Weather Service and the vibrant private weather community that exists today.

Specific Endorsements of a Climate Service Line Office
The unanimous conclusion of internal and external scientists and decision makers was that establishing a single management structure for the agency's core climate capabilities is required if the agency is to rise to meet the Nation's growing need for increasingly sophisticated information. One of the key sources of input from among NOAA's external advisers that led NOAA to this option were the recommendations of the NAPA expert panel that concluded, "The Panel strongly supports the creation of a NOAA Climate Service to be establish as a Line Office in NOAA."

More recently, the SAB CWG winter 2011 report further reinforced NOAA's proposal for a dedicated Climate Service Line Office, stating,

> The lack of action in several areas highlighted in the previous reviews speaks loudly to the need for a new line organization for climate services. These responses clearly illustrated the considerable inertia that exists within the present system and the difficulty in moving from a matrix managed program to a line organization. Let there be no mistake: there is a tremendous amount of world-class climate research being performed within the agency. Yet, transitioning such high quality research into a service-oriented and operational setting is quite another matter. There are some fairly major systemic challenges that need to be confronted going from a loose federation of somewhat independent NOAA organizations to a functioning climate service. Short of a Climate Service line organization with budgetary authority, the CWG believes it will prove very difficult to effect change if NOAA's approach to climate services continues in a matrix structure or manner.[2]

NOAA's reorganization proposal closely aligns with NAPA's final recommendations, such as the inclusion of the NWS's Climate Prediction Center, and recognizes the importance of having a temporary leadership position for change management in the new organization. It is clear that to meet the Nation's growing need for increasingly sophisticated information about our changing climate and potential impacts to various sectors, internal and external experts and decision-makers have agreed—NOAA must establish a single management structure to more efficiently utilize and synergize the agency's core capabilities.

Strengthening NOAA Science and Renewing OAR
At its core, NOAA is a science agency and science underpins all that NOAA does. NOAA is committed to using the best possible science to inform our delivery of services, formulation of policies, and execution of management responsibilities. We are developing policies and practices that will promote scientific excellence inside and outside the agency, and enable scientists within NOAA to thrive as they make the discoveries and pursue the research necessary to inform our services and our stewardship responsibilities. NOAA has been working to develop a scientific integrity policy that would ensure a continued culture of transparency, integrity, and ethical behavior in NOAA. Additionally, NOAA is working to support recruitment and retention of scientists through development of a more robust science career track and expansion of senior science positions. NOAA's proposed reorganization adheres to this commitment to scientific

[2] NOAA Science Advisory Board Climate Working Group. 2011 Winter Report.

excellence and embraces the highest standards of scientific integrity. We appreciate and share in the Committee's strong interest in ensuring that NOAA's science enterprise continues advance our understanding of the Earth system such that we can provide Americans with the best possible information to aid their decision making.

Strengthen Science within OAR and Across the Agency

In addition to establishing the Climate Service Line Office, the reorganization proposal is equally focused on and committed to strengthening and integrating NOAA's science enterprise and advancing the vision of OAR. The proposed reorganization does not diminish or eliminate any of NOAA's research or science activities, including OAR. OAR will continue to serve as NOAA's centralized research Line Office, serving all of NOAA by supporting and producing preeminent research and technology innovation that advances NOAA's mission. OAR will innovate (make new discoveries and find new technology applications), incubate (conduct long term research and develop technology to make new discoveries that are useful to NOAA's operations), and integrate (strengthen research and technology across NOAA and with partners).

Throughout the process of developing the proposal, NOAA carefully reviewed the role and structure of OAR, and it is our firm view that OAR is uniquely important in providing a dedicated science and research enterprise within NOAA and should be maintained as NOAA's core capacity to provide long-term atmospheric and oceanic research, science integration, and technology innovation. The experience of Deepwater Horizon highlighted the value of NOAA science to support decision-making and the delivery of trusted and accurate information. During the crisis, OAR was able to take advantage of a deployed research asset that was already being used for research purposes- the P-3 aircraft – to estimate oil leak rates from the air. That flexibility and ingenuity are what enables a strong research enterprise that is responsive to real-time and long-term future needs. NOAA will look to OAR to play an expanded role as the integrator of science and technology across NOAA and provide research that supports NOAA's Next Generation Strategic Plan, and OAR will continue to foster and grow collaborations with both the internal and external scientific community. While the Climate Service Line Office will strengthen climate science and deliver climate services, OAR will continue to grow as an incubator of long-term and innovative research and integrate science across all of NOAA.

Renewing OAR's research agenda is part and parcel with the proposal to create a Climate Service Line Office. Our motivation is that, just as OAR has served to incubate and advance climate science over the last four decades to a state where it can more readily inform climate services, the proposed reorganization will renew OAR's focus as an innovator and incubator of new grand challenges in oceanic and atmospheric science, technologies, and applications. In the proposed reorganization, OAR's portfolio would rise to meet science challenges including:

- Coordinating and managing emerging and transformational research portfolios including ocean acidification; innovative development of improved meteorological, oceanic and atmospheric observing technologies; modeling and forecasting to expand the use of renewable energy sources; unmanned air and underwater observing systems; high performance computing; and weather "warn-on-forecast" programs to increase lead time and accuracy for hazardous weather.

- Emphasizing areas that are important challenges and opportunities for NOAA, such as fostering integrated ecosystem science beyond its current scope to include new tools for sustainable community planning, novel ways to observe the world around us, new ways to conduct fishery assessments, and innovative aquaculture and feed technologies.
- Moving NOAA toward a fully integrated approach to environmental modeling that spans the full domain of physical, chemical, and biological systems.

That said, strengthening science and fostering a culture of innovation across the agency remains a critical priority for NOAA. OAR performs a critical set of functions for NOAA's research enterprise as NOAA's central research Line Office, serving all of NOAA by supporting and producing long-term and transformational research and technology innovation that advances NOAA's mission. In its report, NAPA echoed this important role and the need to sustain OAR as a Line Office, as we work to stand up a Climate Service Line Office that necessarily includes climate science and service, "all parts of NOAA benefit from OAR's work to incubate fundamentally new approaches to mission-centered science, a capability best sustained by maintaining a nimble, freestanding OAR Line Office."

Under the proposed reorganization, OAR would, in cooperation with other Line Offices, including a Climate Service Line Office when approved, guide the analysis and direction of NOAA's agency-wide research portfolio. This responsibility includes: identifying NOAA's science challenges and gaps; recommending novel research portfolio management approaches; integrating science across NOAA's Line Offices to gain a comprehensive understanding of the earth system. To this end, the OAR Assistant Administrator would serve as vice-chair of the NOAA Research Council. Further, as leader of the central research Line Office, OAR's Assistant Administrator will be designated as the Senior Advisor to the NOAA Chief Scientist and responsible for providing him or her with science program analysis and policy support.

NOAA's Scientific Integrity Policy

I am excited to share today progress on what I consider the cornerstone for strengthening NOAA's scientific foundation. Last week we published NOAA's draft scientific integrity policy for public comment. Transparency is a key principle in this policy, and in keeping with this principle, we are seeking comments from the public for 60 days. This policy reflects the commitment I made when I first came to NOAA to strengthen science, ensure it is not misused or undermined, and base decisions on good science. By being honest and open about our science, we build understanding and trust. This policy is about fostering an environment where science is encouraged, nurtured, respected, rewarded, and protected. It applies to all NOAA employees, political and career, and addresses applicable policy for grantees and contractors. The policy establishes principles for scientific integrity and codes of conduct for scientists and science managers, including explicitly prohibiting science managers from suppressing or censoring scientific findings. As part of institutionalizing this policy, we are developing a scientific integrity commons website with additional resources, training opportunities, and FAQ for our staff. Our process has been deliberative and inclusive, and we look forward to feedback from the public on the draft policy we have developed. Over the next several months we will work to revise the policy in response to comments, and work with our staff and the Department to finalize and implement a policy that will ensure a continuing culture of scientific excellence at

NOAA, and promote a culture of transparency, integrity, and ethical behavior. We look forward to having a Chief Scientist in place to help us compete and implement this policy expeditiously.

Increasing Budget Transparency

As part of the development of the proposed reorganization, NOAA considered the overall goal for increasing budget transparency across the agency. The proposed reorganization constitutes a consolidation and technical transfer of climate programs into a new Line Office that can better link climate science with decision support and other services being requested by the public. It does not eliminate or otherwise diminish any of NOAA's science mission, and NOAA's overall funding for cutting edge research – whether climate or other critically important areas like oceans and weather – is not proposed to be reduced.

The structure of the proposed Climate Service Line Office and OAR budgets provide considerable transparency into the funding levels for the underlying programs, thereby better enabling Congress and the public to ensure that climate or other NOAA science is not diminished. The funding associated with the labs and programs that are proposed to be transferred from OAR to the Climate Service Line Office will be maintained and in some instances, such as ocean acidification and weather radar research, the FY 2012 Budget proposes targeted new investments in OAR for cutting edge science.

Conclusion

We have not yet created a Climate Service Line Office, but believe doing so would be the best thing for NOAA and the Nation in order to provide the services American businesses and communities need to compete and respond to changing environmental and economic landscapes. The proposal to bring climate science and services together under one Line Office is fundamentally sound and provides a tremendous opportunity to integrate science and service delivery without detracting from a commitment to pursue, fund, and sustain basic research and science across the agency. NOAA's proposal has been highly vetted within the agency by our scientists, managers, and SAB, across the federal government, and from numerous external groups and individuals representing the brightest minds and thought leaders on climate science, service and organizational development. The proposal reflects the same basic organizational structure recommended by NAPA, and was submitted to Congress for approval as part of NOAA's FY 2012 Budget Request.

The proposed Climate Service Line Office would provide NOAA with the most efficient and effective structure to engage the American public and deliver timely and trusted information to a diversity of sectors and communities to make informed decisions to prepare for and become more resilient to environmental hazards. Climate information users recognize that climate variability and change bring not only new challenges to managing business, industry and the environment, but also new opportunities for innovation, adaptation and commerce. They want trusted and timely information so they can make informed decisions that minimize their own exposure to climate impacts while maximizing their future opportunities.

NOAA's deep regard for our responsibilities as sound stewards of taxpayer dollars is reflected in this reorganization proposal where we outlined our strategy to deliver sound products to our users while maximizing organizational efficiency, creating jobs and stimulating economic

growth. These are chief priorities for NOAA and the entire federal government. In addition, the Climate Service Line Office will create a place where new markets for private sector service providers can grow. These businesses can take information and products generated by the government and convey them to the public, using a model similar to those that provide weather products.

This proposal is a good thing for the American taxpayer, for Congress, and for NOAA. I believe it is the right solution for NOAA to better meet the Nation's current and future climate service demand. In summary, the proposed reorganization will allow NOAA to better enable Americans to make informed investment choices, build private sector jobs, grow a climate service-oriented sector of the economy, and create resilient communities while refocusing and strengthening NOAA's capacity for high quality, transformational research across the agency. This proposal does not grow government, it is not regulatory in nature, nor does it cost the American tax payer any additional money. This is a proposal to do the job that Congress and the American public have asked us to do — only better.

<u>Appendix A:</u> Scope and Demand for NOAA's Climate Services.

The increasing demand for NOAA's climate data and service products is real and it is happening now. The following statistics demonstrate the tremendous increase in public user demand from requests through a number of NOAA's user interfaces, such our data centers and climate web portal.

- From FY 2009 to 2010, NOAA saw an ***11 percent increase*** in direct requests for climate related data and information services (including individual requests via phone calls, emails, and other direct correspondence) - from 26,000 to 29,000 individual requests.
- NOAA's data centers provided ***86% more climate related data products*** in FY 2010 compared to FY 2009 – from 806 terabytes to 1500 terabytes (or 1.5 petabytes). To put this in context, a Kindle or other electronic book download averages about 800,000 bytes. In 2010, NOAA served up a total of at least 1.9 billion Kindle books worth of climate data, roughly 867 ***million*** more Kindle book equivalents than in 2009.
- In 2010, NOAA's National Climatic Data Center's (NCDC) Comprehensive Large Array Data Stewardship System site served over ***five times as much climate related data*** as in calendar year 2009 – from 43 terabytes to 253 terabytes.
- From FY 2009 to FY 2010, NOAA had a ***57% increase in climate related data and information website hits*** – from 906 million to 1.4 billion hits in addition to hits to the NOAA Climate Portal that launched in February 2010, and currently hosts over 27,000 visitors every month.

Within this increasing demand are requests from a breadth of economic and industrial sectors, including government, private sector, and non-government users. Demand starts at the most basic and familiar – your local TV weather forecaster relating the daily temperature and precipitation to an "average" for the day, to the strategic – forecasting climate conditions around the world to inform national security priorities. Below are specific examples of the types of services and data requests that have been received by NOAA.

- Farmers require seasonal temperature, precipitation, and frost-freeze data to determine what types of crops will grow well and when they should be planted.
- The U.S. Department of Agriculture uses NOAA's climate information to develop regional, national and global crop outlooks that provide the agricultural industry information about short-and long-term conditions that may impact crop production.
- NOAA's data are used to develop Plant Hardiness Zones which you can see on the tags of virtually all plants and trees you buy to ensure they will thrive in the climate conditions in which you live. As these zones change, NOAA's climate data provide the basis to ensure accurate depiction of the Plant Hardiness Zones.
- Local communities and emergency management offices use NOAA's sea level and storm frequency information to help them prepare for and become more resilient to short-term storm events, such as hurricanes and longer term phenomena, such as sea level rise.
- Municipalities accessed NOAA's U.S. Snowfall Climatology information, which includes historical information about the severity of extreme snowfall events and return period probability, to develop annual snowfall removal budgets resulting in cost savings.

- Home builders follow guidelines that use NOAA data to determine the type of foundation and the optimal thermal characteristics of buildings for insulation purposes. This information is said to save roughly $330M in annual building construction costs and annual energy cost savings of 586,000 megawatt hours (the annual energy savings equivalent to almost nine million gallons of gasoline) from using just one of NOAA's climate tools.[3]
- Ice thickness and freezing rain data are used for engineering design consideration in the construction of certain structures that are subject to outdoor weather.
- NOAA's maximum precipitation predictions have been used to develop new standards for dam design that are now used to improve dam safety and reliability.
- NOAA's climate forecasts, from seasonal precipitation and drought outlooks to weekly on-the-ground assessments of the U.S. Drought Monitor, are helping firefighters in Texas to prepare for and respond to a record wildfire season.
- NOAA works closely with the U.S. Army Corps of Engineers and water resource managers to provide longer-term drought and flooding outlooks and river forecasts, which are critical to effectively manage water levels in rivers important for transportation, such as the Mississippi, Missouri and Ohio rivers.
- Insurance companies use NOAA data (e.g. the "normal" temperature, precipitation, mean height above sea level, and storm frequency) to calculate insurance premiums.
- Public health departments use NOAA data to inform air quality and UV forecasts.
- Coastal managers use NOAA's sea level data in efforts to restore wetlands for fish, shellfish and bird habitat.
- Salmon fishery managers use information about temperature, precipitation and snowpack to plan for and manage fish hatchery operations and in-stream habitat restoration efforts.
- Counties use NOAA information, such as trends in precipitation to make long-term investments in storm-water management and storage capacity.
- Public service and utility commissions around the country download NOAA's Climate Normals, which include spatial and temporal averages of climatological variables (e.g., temperature and precipitation) that describe base climatic conditions. Utilities subsequently use this information in formal processes to determine the rates that utilities charge.

[3] *Economic Value for the Nation*, NOAA Satellites and Information, September 2001.

APPENDIX B: Review Criteria and Options Not Selected for NOAA's Proposal.

NOAA evaluated its four organizational options against the following design criteria:

Strengthen science in the agency

- Strengthen and enhance the visibility, quality and relevance of science that supports NOAA's Mission and long term strategy
- Integrate climate science within the Climate Service Line Office and across NOAA to address cross disciplinary areas such as climate and coastal, and climate and ecosystems

Minimize disruptions and promote efficiency

- Promote efficient implementation and operation
- Minimize organizational complexity
- Utilize existing programs to the greatest extent possible

Establish climate leadership

- Create a single line of accountability and responsibility for performance
- Create a senior advocate for climate policy, strategy and budget within NOAA

Enhance program coordination

- Develop effective mechanisms that leverage program execution from across the agency and with our partners

Promote user engagement on climate

- Create clear points of access for users
- Facilitate and improve stakeholder engagement
- Integrate user input into service development

The following options were reviewed by NOAA but not selected:

Option A. Consolidate Major Climate Science and Service Assets in NWS

- Relevant climate activities from across the agency would be removed from their current Line Office and consolidated in the NWS Line Office.
- The NWS Line Office would be renamed the National Weather and Climate Service Line Office.
- Climate science, services, and data stewardship would be added to NWS.

Analysis: The dedicated people of NOAA's NWS excel at the 24 hours a day, seven days a week, on-time and on-demand operational aspects of delivering weather services that the Nation relies on to protect life and property. NOAA must ensure that the business practices and management structures that have made the NWS successful are not compromised. Preserving the business structure that is needed for weather service delivery, which entails providing products in a short timeframe (from minutes to days), could inhibit the development and growth of climate service delivery, which occurs on a longer time scale. In addition to the well recognized concerns of "research versus operations" our decision not to risk compromising the

critical operations of the NWS was rooted in the fundamental nature of weather service operations, versus climate service operations. Weather and climate services are related, but they have fundamental differences. Climate services are relevant to longer time scale decisions, such as where and how to build critical infrastructure, or whether water conservation measures need to be taken now to mitigate the upcoming drought season. Although climate assets would be consolidated, the management of a National Weather Service and Climate Service Line Office would have to focus on an overly broad array of national priorities, ranging from immediate needs, such as this year's flooding in the Midwest and the outbreak of tornadoes, to working with other agencies to chart the course of the Nation's long term climate science strategy. In addition, the option was not characterized as having a highly positive impact on strengthening climate science. Finally, in evaluating the impact of this option on promoting user engagement, NOAA found that while this structure would allow the leveraging of the NWS' connections to the user community that adding the full scope of an emerging and evolving climate engagement effort may detract from critical weather engagement functions.

Option B. Eliminate OAR and Consolidate Major Climate Science and Service Assets in a New Climate Service Line Office

- OAR is eliminated and a Climate Service Line Office is created.
- OAR labs, programs, and activities relevant to climate would be housed in the Climate Service Line Office.
- OAR programs and activities not relevant to climate would be moved from OAR into other relevant Line Offices, aligning science with operations across the agency.
- The only Line Office dedicated only to innovative, long-term research would be eliminated.

Analysis: The value of having a central research function that supports long-term research and innovation, and integrates science for all of NOAA's key mission areas is critical for NOAA's success. Aligning all of our research assets with their operational counterparts would likely result in positive outcomes in some instances (e.g., further aligning ecosystem research that supports fisheries management within the National Marine Fisheries Service) but not in others (e.g., moving weather research to within NWS). This option would also be contrary to the criteria for strengthening science within the agency. It would narrow the vision and scope of NOAA's research (e.g., ecosystem research would have more difficulty expanding beyond fisheries if all of it were located in the National Marine Fisheries Service). Having an entity within NOAA that is looking over the horizon and at NOAA's next generation science needs is critical. This option also created significant organizational disruption to all other Line Offices that would be acquiring new assets.

Option C. Consolidate Major Climate Science and Service Assets in OAR

- Centers, programs, and other climate-relevant activities would be moved from their current Line Offices into OAR.
- OAR would be renamed the NOAA Climate Service and Earth Systems Science.
- Services and data stewardship would be added to NOAA's centralized research capacity.

Analysis: Including all of NOAA's climate capabilities in the same Line Office as NOAA's non-climate research was viewed as creating a single entity within NOAA with too broad and diverse a mission. This option was anticipated to: (1) compromise the ability of OAR to focus on next-

generation science for all of NOAA by putting a service delivery function into their mission, and (2) prevent climate services from being fully developed due to competing mission requirements. Such a Line Office would have multiple competing interests under a single management structure, which only continues NOAA's current organizational challenges associated with its climate portfolio. These competing organizational demands were also viewed to detract from NOAA's ability to have a Line Office dedicated to strengthening NOAA science across the agency, and similarly create too diverse an office mission to focus on climate program coordination and user engagement.

APPENDIX C: The Proposed Structure Will Increase Efficiency and Produce Benefits.

The proposed Climate Service Line Office would consolidate management of a number of NOAA's climate science, research and observation centers along with NOAA's data and service delivery infrastructure. This arrangement would provide an efficient and effective climate research to service enterprise under a central management authority to further the goal of having a single, authoritative source of climate information. I strongly believe that this proposed reorganization is the right solution.

Organizational Efficiencies

By consolidating NOAA's climate activities in one Line Office we will be able to realize organizational efficiencies that will translate into a more effective response to the Nation's increasing demands for climate information, including a single point of access to NOAA's climate data and tools and supporting the growth of the emerging private sector climate services industry. These organizational efficiencies include:

Reduce Multiple Administrative Requirements and Better Transition Science into Usable Services

In proposing to house NOAA's existing climate research capacities in the proposed Climate Service Line Office, a structure strongly endorsed by NAPA, NOAA will both be able to continue to advance its high quality climate science and more readily transition scientific findings into usable services. The proximity of science and service capabilities will provide more streamlined and efficient interaction between these components and allow climate science and service development to go hand in hand to develop products and services that can evolve in response to scientific information as it emerges. The consolidation of management for both science and service under one organization will reduce multiple planning, coordination, evaluation, and reporting burdens that are currently required as a result of the distribution of climate capabilities in multiple Line Offices. By reducing these inefficiencies, greater effectiveness can be achieved in executing NOAA's funding for science and service development and delivery.

Capture Material Efficiencies

Some activities not entirely dedicated to climate are included in the proposed Climate Service Line Office in order to realize significant material efficiencies. For example, both the National Oceanographic Data Center and the National Geophysical Data Center are proposed to reside in the Climate Service Line Office as compliments to the National Climate Data Center. NOAA has been working to consolidate our data center functions across the agency by putting NCDC, NODC, and NGDC in the same Line Office. Although the scope of their work supports a variety of mission areas, the common foundational infrastructure on which data centers are built is uniform and should be kept together. NOAA will continue to consolidate these functions to grow material efficiencies by moving all three data centers into the Climate Service Line Office.

Improved Science and Service

The proposed Climate Service Line Office will provide a reliable and authoritative source for climate data, information, and decision-support services to help individuals, businesses, communities and governments make informed choices to help prepare for and anticipate the

effects of a changing climate. It will make our information more visible, accessible and useful to our many partners and users, allow us more efficiently and effectively steer and coordinate our existing world-class science and information products, and improve our capacity leverage the other assets – both within NOAA and externally – through a unified set of priorities and a single management structure. The proposed Climate Service Line Office will:

- Develop a sustained capacity to provide regional and sectoral climate vulnerability and risk assessments to meet NOAA's requirements under the U.S. Global Change Research Act;
- Clearly establish a regional focus coordinating and providing climate services - deliver locally relevant climate information that will help existing businesses and local communities maximize opportunities and minimize their exposure to risks in a changing environment to safeguard lives, property and economic investments;
- Better align climate observing and modeling assets with strategic needs;
- Improve integration and coordination of climate communications and outreach efforts throughout the agency;
- Create a visible and easy to find, one-stop trusted source for information from the public, the private sector, and other government agencies to access NOAA's climate science and service assets; and
- Enable improved information sharing and more productive partnerships with federal agencies, local governments, private industry and other users and stakeholders.
- Establish an improved budget structure that provides considerable transparency into the funding levels for the underlying climate programs, thereby allowing Congress and the public to ensure climate science is not diminished.

Strong Internal and External Partnerships

No one agency or community can provide all of the climate services that the Nation needs, and the Climate Service Line Office requires an organizational framework that fosters sustained dialog with diverse scientific and service communities. These communities include DOC; other parts of NOAA; federal, tribal, state, and local agencies; academic partners; private industry, non-governmental organizations, and the international community. The Climate Service Line Office will work with each sector, ensuring that emerging scientific findings are transformed into high-quality products responsive to user needs.

Science and Service Synergies through a National Climate Service Enterprise[4]

In general, climate science and services are still in their infancy compared to, for example, weather science and services. The Climate Service Line Office will evolve iteratively, incorporating vigorous research investigations and discovery, and considering new processes, user requirements and feedback. Weather services are driven by the necessarily fast information transmission and the sheer quantity of forecasts, watches, and warnings. Integrating emerging science into these demanding mission-critical operations requires a deliberate approach. Because climate services will often have a longer time horizon, new and emerging science can be more readily used in climate services.

[4] The "National Climate Service Enterprise" is used as shorthand in reference to the emerging interagency and private-sector investment in climate services.

An effective Climate Service Line Office will adopt an approach of "co-production of knowledge" with decision makers.[5] The intent of "co-production" is climate science that informs, but does not prescribe, decision-making. Similarly, decision-making should inform climate science, but not prescribe research priorities. The Climate Service Line Office must balance this 'user pull and science push'. Rapidly growing demand for climate services will challenge the Climate Service Line Office to expand its products and research information to address user needs. It is also important to recognize that science can anticipate the emergence of new risks.

Expanded Engagement through Assessment Services

Climate Science Assessments comprehensively summarize the knowledge gathered from many studies and disciplines into authoritative overviews of climate variability, change, and impacts. Science assessments characterize uncertainties based on documented information and identify gaps in understanding to help prioritize future research and service development. Because the assessment process exemplifies the synergy between science and service, the Climate Service Line Office will use assessments to inform policy advisors, community planners, and decision makers, as well as its own research agenda. The Climate Service Line Office will only participate in Climate Science Assessments that have standards in place which meet or exceed those of Information Quality Act. The Climate Service Line Office will focus on two types of Climate Science Assessments: (1) national and international assessments, and (2) problem-focused assessments. A third type of assessment—stakeholder needs assessments—will help ensure that the climate science and services are brought to bear on relevant issues. Together, these three types of assessments serve as powerful tools to guide the design of high-quality regional service products, and will frame dialogues among climate scientists and service providers and regional users.

Enhanced Traceability, Credibility, and Transparency

Through strength in research, the Climate Service Line Office will aim to grow the body of scientific knowledge about climate variability and change, including the determination and quantification of uncertainties and confidence intervals. Because the Climate Service Line Office will use and tailor new science to address applications and user needs, the Climate Service Line Office will ensure its data, information, and services meet the highest standards of scientific excellence. This mandates careful quality assurance, including:

- Rigorous and internationally-recognized procedures for calibration and validation of observation and monitoring systems
- Transparent peer-review procedures for articles, documents, and assessment reports
- Quantification and accurate communication of uncertainty in model outputs
- Accessible metadata documenting the quality of data products and services

Creating a Culture for Success in the Climate Service Line Office

[5] Ostrom, E., 1999: Crossing the Great Divide: Coproduction, synergy, and development. In: *Polycentric governance and development: Readings from the workshop in political theory and policy analysis* [McGinnis, M.D. (ed.)]. University of Michigan Press, Ann Arbor, MI, 346–374

To create a new culture of shared learning that values the co-production of knowledge, advances scientific understanding of climate, and delivers relevant, usable services, the Climate Service Line Office will need to adopt business practices that:

- Promote ongoing and sustained engagement with policy advisors, community planners, and decision makers
- Provide for the rapid infusion of research findings into products and services
- Nurture the growth of science and service within a single organization as complementary rather than competing activities
- Balance what users want and what is justifiable scientifically
- Recognize science and research as valuable services in their own rights
- Value communication and education as both a contribution to services and to research
- Link research to decision-making as an alternative to the more traditional research–to-operations paradigm
- Incorporate a fast-track review process for information products to meet the time-dependent information needs of decision makers
- Leverage innovative tools to enhance communication and collaboration with stakeholders