Report of

Congress on Sustaining Natural Resources and Conservation Science: What is at Stake in the Years Ahead

RENEWABLE NATURAL RESOURCES FOUNDATION
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Congress on Sustaining Natural Resources and Conservation Science: What is at Stake in the Years Ahead

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Congress Program Committee

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Table of Contents

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Appreciation goes to **Christine McEntee**, Executive Director/CEO of the **American Geophysical Union**, for hosting the congress at AGU's state-of-the-art conference facility in Washington, D.C.

A special thank you to **Matt Hourihan** and the **American Association for the Advancement of Science** for extensive analyses of federal agency budgets and funding trends, and for AAAS's exceptional leadership in the current national debate about federal science funding in the context of deficit reduction.

Ann Cairns of AGU served most capably as chair of the congress program committee. Ann brought leadership and experience to the table. The congress program committee was a group success and every member made significant contributions. Committee members are listed on page three.

RNRF Program Director **Melissa Montagna** performed admirably in working with our committee, delegates, and speakers. She managed meeting logistics and joined me in preparing and editing this report.

Finally, sincere appreciation goes to the speakers and delegates who contributed their expertise and experience, and demonstrated a commitment to conservation management and science. Congress speakers and delegates are listed in the appendices.

Robert D. Day
Executive Director

Introduction

The U.S. Congress is currently engaged in a contentious debate about how to reduce the federal deficit by increasing revenues and reducing expenditures. The path forward has been complicated by recognition that raising revenues too much or too quickly or cutting expenditures too much or too quickly could imperil the nation's fragile economic recovery. Imprudent choices also could saddle America's most vulnerable with increased hardship in an already challenging environment.

Another significant element of the public debate has been the highly publicized concerns about potential adverse impacts on military operations and discretionary non-military programs. Some participants in the debate have advocated that only discretionary non-military expenditures should be cut to reduce the deficit. Only belatedly has there been emerging recognition of the potentially devastating impacts that proposed cuts will have on the nation's environmental programs, natural resources management, and science infrastructure. Federal, state and local programs are all at risk.

Professional, scientific, educational, design/engineering elements of the conservation community are concerned by the relentless diminishment of U.S. environmental programs without a meaningful dialogue about the consequences of such reductions. In this rush to cut expenditures in the name of deficit reduction, budgetary decisions do not appear to be informed by adequate knowledge of what critical resources are at risk. We face the loss of integrity of America's terrestrial and aquatic ecosystems, the quality of our air and water, built infrastructure that facilitates the management and conservation of essential water resources, and our world-class science and research enterprise.

In this rush to cut expenditures in the name of deficit reduction, budgetary decisions do not appear to be informed by adequate knowledge of what critical resources are at risk.

Directors of the Renewable Natural Resources Foundation (RNRF) recognized the importance of a dialogue about the consequences of these reductions and authorized a "Congress on Sustaining Natural Resources and Conservation Science: What is at Stake in the Years Ahead." The congress brought together a select group of leaders from RNRF member organizations, and from government, industry, academic and nongovernmental organizations (see delegate list at Appendix D). Delegates met December 13-14, 2012, at the American Geophysical Union conference facility in Washington, D.C. (see congress program at Appendix E).

Congress delegates assessed the financial climate at federal agencies and the entities that they support (including universities and regional programs) and discussed critical services provided by federal management agencies. Delegates also discussed the history of environmental management in the U.S. and reviewed public polling evidence of continuing support for conservation initiatives locally and nationally.

About This Report

This report begins with an overview of funding trends for research and development (R&D) at science and environmental management agencies over the past decade. Next, specific natural resource management agencies are examined in the context of historical program priorities and estimated budget cuts under various sequestration scenarios.

Speaker presentations and delegate comments are augmented with information from federal agency budget requests, analysis by the American Association for the Advancement of Science (AAAS), and national media analysis. Details regarding budget priorities and allocations are subject to change. Interested parties should visit the Office of Management and Budget (OMB) website[1] and federal agency budgets for the most up-to-date information on the sequester[2].

Appendices at the end of this report provide additional information on the current fiscal situation, America's historic international leadership role in natural resources conservation, and analysis of recent public polls describing continuing support for environmental initiatives. Remarks and presentations of speakers are available at RNRF's website (www.rnrf.org).

[1] http://www.whitehouse.gov/omb

[2] The sequester is a package of automatic spending cuts created by the Budget Control Act of 2011. The cuts, which were initially scheduled to begin in January 2013 absent action by congress, are evenly divided between discretionary defense and nondefense spending. To prevent the sequester, congress was required to identify $1.2 trillion in deficit reduction. Per an agreement in the American Taxpayer Relief Act of January 2013, the sequester was delayed until March 1, 2013, and the deficit reduction goal was decreased to $85 billion for the current fiscal year. The sequester and the political process which led to its inception are discussed further in Appendix A.

The Federal Deficit War — 2009 to Present

Four years ago as the U.S. economy descended into the Great Recession, congressional debate was all about averting total economic collapse. Congress acted to pump money into the economy to create jobs, stimulate growth, and halt bankruptcy of major financial institutions. Today, most observers agree that the economy has been stabilized and has improved modestly and tentatively.

The daunting task of keeping the economy on a recovery track while addressing deficit concerns is complicated by an ideological divide about the role of government. A further complication is the arcane approach being employed by congress to sort out federal spending and revenues.

Sequestration — Congress failed to meet the March 1, 2013, deadline to comply with requirements of the Budget Control Act of 2011 and American Taxpayer Relief Act of 2012. Congress was to have identified an additional $85 billion in deficit reductions over the next decade to prevent across-the-board cuts via sequestration. Perhaps sequester issues will be resolved and/or delayed as part of the continuing resolution debate.

Regardless of how current obstacles to a financial settlement are resolved, debate about the funding of federal programs will continue far into the future.

Continuing Resolution— A continuing resolution passed by congress in September 2012, which provides funding for the federal government to operate, will expire on March 27, 2013. In the absence of action by congress to extend the resolution or pass appropriations bills, the government will shut down. Perhaps sequestration and continuing resolution issues will be resolved and/or delayed as part of the federal debt ceiling debate.

Federal Debt Ceiling— On January 31, 2013, the current debt ceiling was suspended by congress until May 18, 2013. Thus, the government can continue to borrow to fund essential government services. In the absence of congressional action by the deadline, the debt ceiling will be set to the amount of debt existing at the time of the deadline. It is currently estimated that the federal government could continue to operate until sometime in July by taking extraordinary measures. However, passage of the deadline without action will stand as stark evidence that financial paralysis continues. Default is ultimately the outcome of inaction.

This passing parade of fiscal deadlines and their related debates could be distracting congress from structuring a comprehensive and longer-lasting financial plan. Regardless of how current obstacles to a financial settlement are resolved, debate about the funding of federal programs will continue far into the future.

Federal Funding Trends

Although cuts required by legislation that created the sequester will not be fully implemented for months, federal management agencies are still facing severe budgetary restrictions, and have been for some time. Congressional appropriations have consistently decreased spending for environmental and science agencies over the past thirty years. This trend is expected to continue to the detriment of America's land, water and air. Following is a brief assessment of the priorities established by natural resource management agencies and the extent of the cuts they face due to the sequester and other deficit-reduction measures.

Matt Hourihan, director of the R&D Budget and Policy Program at AAAS spoke about federal funding trends for conservation management and science. He presented historic trends of investments in science over the past decade, and the current funding situation and prospects at federal agencies.

Federal funding for R&D has been largely flat for the past decade of congressional appropriations. Federal nondefense R&D funding has declined by 5% since 2011. In the fiscal year 2012, R&D in the areas of natural resources and the environment constituted only 1.4% of the total federal nondefense R&D budget. This percentage has decreased significantly in the past decade; since 2003, environmental R&D programs budgets have decreased by 15% and agricultural R&D programs have decreased by 20.2%. In comparison, energy R&D has experienced a 37.1% budget increase.

Since 2003, NOAA has experienced one of the single largest agency [funding] declines - 29%.

Environmental R&D budget trends show long-term declines or stagnation across-the-board. It is given a lower priority relative to general science, defense, manufacturing, and energy R&D. Much of this relative decline can be attributed to the polarization and politicizing of science, particularly through phenomena like the "climate wars."

Among the environmental R&D agencies, financial support for the past decade has not been uniform. Compared to 2003 levels, the R&D budget for the Department of the Interior has remained fairly constant. NOAA, in contrast, has experienced one of the single largest agency declines in the same time period (-29%). Within NOAA, the Office of Oceanic and Atmospheric Research has experienced the smallest relative decline; the National Marine Fisheries Service has experienced the largest.

EPA's R&D budget has decreased 18% since 2003, although air, climate, energy and water budgets have remained relatively steady since 2005. During upcoming annual appropriations, the EPA is expected to be a target for House budget cuts due to previous funding increases and

support from the American Recovery and Reinvestment Act of 2009. EPA is additionally at the center of several politically charged environmental controversies, including hydraulic fracturing and Clean Air Act enforcement. Non-research funding, specifically for State and Tribal Assistance Grants (STAG) and the Environmental Programs and Management Budget (EPM), is expected to be severely affected in fiscal year 2014 budget appropriations.

R&D budgets at EPA, NOAA, DOI and USDA will face nearly $1 billion in cuts through 2017 if the sequester is fully implemented.

Of the spending cuts and adjustments identified as of the publication of this report, very little is explicitly associated with specific agencies. Rather, cuts are directed at discretionary spending as a whole. It is difficult to assess specifically how individual agencies will adapt to proposed spending cuts until the cuts occur and/or agencies make their plans known. Likely consequences, however, will include a diminishment of availability of grants, reduction or termination of select programs, capital projects or overhead, or withdrawal from current partnerships.[3]

The current model for sequestration (the balanced or equal allocation model) specifies that cuts will be divided evenly between defense and nondefense discretionary accounts. However, in the Republican-controlled House there remains interest in protecting defense budgets and shifting some or all of the cuts onto nondefense agencies (the nondefense only model). A proposal of this nature passed the House as part of the fiscal year 2013 Budget Resolution developed by the House Budget Committee under Chairman Paul Ryan. Although this scenario appears unlikely to pass in the Senate or escape a presidential veto, support remains and thus this possibility must be considered.

Program cuts enacted at federal agencies in the years ahead will be reflective of the priorities of those agencies. Although it is generally accepted that budgets will be tighter at agencies throughout the federal government to reflect current debt-reduction priorities, the severity of the situation remains in question. If the sequester is fully implemented in either form, productivity at all levels of the federal government will suffer. Critical programs will be put at risk due to lack of critical monetary and personnel resources.

[3] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.

Office of Management and Budget – Role and Priorities

Budgets of federal agencies are ultimately determined by OMB. Thus, it is important to consider the priorities of OMB and those of affected natural resource management agencies. Understanding political imperatives makes it easier to develop a comprehensive budget strategy for the years ahead that does not sacrifice economic viability or critical ecosystem management functions.

OMB's priorities are:

1) Innovation
2) Manufacturing
3) Green energy
4) Science, Technology, Engineering & Math (STEM) education
5) Cyber-security
6) The economy
7) Jobs

To promote the increase of budgets dedicated to environmental management agencies, it is important to reconcile their priorities with those of OMB and to communicate those priorities in such a way that conveys their value.

The sequester has been triggered and fiscal year 2014 budget requests have not been released. Specific program reductions are speculative at this time. However, it is likely that these forthcoming budget requests will identify spending priorities embraced by agencies during the coming years of financial stringencies and uncertainty. The threat of deficit reduction is not new, so past budget requests provide some insight into future agency priorities.

Agency-Specific Budget Cuts and Priorities

Following is a discussion of estimated budget cuts at selected federal agencies (USDA, NOAA, EPA, and DOI) and a brief description of program priorities established in past budget requests. The cuts described are estimated below a calculated baseline under the balanced sequester and the nondefense only model, as identified by AAAS in September 2012. Its analysis extends through 2017, the last year for which OMB provides price deflators allowing the AAAS to adjust for inflation.

Although few agencies or departments were selected for investigation in this report, significant budget cuts are not limited to the environmental and science agencies discussed below. All defense and nondefense agencies are currently slated for massive cuts via sequestration, and R&D and science initiatives across the board will suffer.

United States Department of Agriculture (USDA)

The USDA is responsible for the development and enforcement of federal agricultural, forest, farming, and food policy. Its research efforts encompass a diverse array of areas including crop and livestock productivity, food safety, sustainability, biotechnology, bioenergy, biodefense, nutrition, health, and conservation. USDA's Agricultural Research Service (ARS) currently maintains over 100 facilities and research centers throughout the United States. The National Institute of Food and Agriculture (NIFA) funds research through competitive grants to universities, state research centers, and other entities. In the interest of sustaining income on farms, USDA has prioritized a continued investment in R&D to sustain agricultural activity in the years ahead.

USDA Priorities

USDA's fiscal year 2013 budget request reflects four strategic goals embraced by the department. An overarching goal embraced by the department in managerial functions is to improve collaboration among mission areas and agencies and to strengthen the effectiveness of programs implemented by the department.[4] Although USDA has not released a budget request for fiscal year 2014, priorities established by the department will likely be similar:

***Prosperity of Rural America*:** USDA's goal is to ensure that rural communities are self-sustaining, repopulating and economically thriving. To support these regions, the department is promoting income support, disaster mitigation, and farm loan programs. USDA additionally requested increased funding for competitive grants through the Agriculture and Food Research Initiative.

***Conservation and Resiliency of National Forests and Private Working Lands*:** USDA recognizes the importance of conserving forests and grassland for the continued benefit of clean air and water, wildlife habitat, and capacity to mitigate and adapt to climate change. The department works to support and conserve farms, ranches, forests, and public lands through the America's Great Outdoors initiative, as well as the activities of USDA agencies including the National Resources Conservation Service, Farm Service Agency, and Forest Service. Specific programs identified in the budget include the Collaborative Forest Landscape Restoration Fund and targeted conservation activities at designated priority landscapes including the Chesapeake Bay and the Great Lakes.

***Support food security by promoting agricultural production and biotechnology exports*:** To promote political stability and the economic vitality of developing nations, USDA is working with other federal partners to reduce global food insecurity and increase agriculture-led economic growth in developing nations. Key programs within this mission area focus on capacity-building, technical assistance and food assistance programs and include the McGovern-Dole International Food for Education and Child Nutrition Program and the Sustainable Agriculture Research and Education Federal-State Matching Grant Program.

[4] USDA. "FY 2013 Budget Summary and Annual Performance Plan."

***Ensure that America's children have access to safe, nutritious, and balanced meals*:** The department continues to focus on program integrity and implementation of the Healthy, Hungry-Free Kids Act of 2010. USDA is additionally working to limit foodborne illness and improving consumers' knowledge about the food they eat.

USDA has jurisdiction over a wide range of critical food and land-related programs and issues. However, since fiscal year 2010, the department's operating budget has decreased by 12%, severely limiting program capacity. The department's fiscal year 2013 discretionary budget request is modest, consistent with fiscal year 2012 funding levels, or approximately $24 billion.[5] To continue to succeed in program operations while managing financial reductions, USDA has transitioned to function with less money, less staff, and more complex programs.

As of AAAS's analysis in September 2012, an equal allocation sequestration scenario at USDA would have resulted in 7.6% in cuts to R&D, or $874.6 million over the next five years. This would serve to reduce the department's budget to fiscal year 1998 levels. Should only nondefense discretionary accounts face sequestration, USDA's R&D cuts would increase to 17.5%, or $2 billion fiscal year 2012 dollars. Under this scenario, USDA R&D capacity would reach its lowest point since fiscal year 1989.[6] Due to adjustments to the sequester by the American Taxpayer Relief Act, across-the-board budget cuts at nondefense discretionary agencies have been reduced to 5.1% for the 2013 fiscal year. However, as these cuts have been implemented nearly midway into the year, they are functionally equivalent to a 9% reduction according to OMB estimates.

USDA Services and Challenges

Ann Bartuska, USDA Under Secretary for Research, Education & Economics, discussed trends in the management of land resources and ways in which USDA is responding to decreased financial support. Bartuska indicated that our land resources are in a highly fragile transition state that will require careful planning and management in the future. USDA anticipates several major challenges that will need to be addressed in the years ahead both in the U.S. and the rest of the world. The Earth's population will reach 9 billion people by the year 2050. Currently 25% of all land is classified as "highly degraded." By the year 2025, 1.8 billion people will potentially live with absolute water scarcity. Additionally, USDA is facing severe uncertainty with respect to climate change, a force that is expected to exacerbate land and water issues and will require major innovation and restructuring of existing infrastructure.

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USDA is challenged with managing land resources in the face of large-scale disturbance and uncertainty. In the years ahead, agency department policies will need to change to reflect the

[5] ibid.

[6] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.

connection between rural and urban systems, particularly with regard to the transfer of food and water. As population grows and the demand for land and land resources increases, careful management of these resources will be necessary to prevent short-sighted destruction and overuse of the land. Bartuska observed that the scope of these challenges is growing as the scale of the issues and the parties involved are changing.

In the years ahead, she stressed that there must be increased liability in environmental market matters. Our landscapes must be viewed in a holistic and sustainable way. To successfully manage our land and ecosystems, informed decisions and advanced science are essential. Management initiatives must be synergetic, synergistic, and complementary to be lasting and successful. At the same time, they must also be federally coordinated and embraced by local communities. This will require that community leaders and those they represent be scientifically literate. They need to be engaged and deliberate in the management of their land. Citizen science and community gardens, she indicated, are a starting point for this variety of participatory management.

National Oceanic and Atmospheric Administration (NOAA)

NOAA's requested budget for the 2013 fiscal year was approximately $5.1 billion, 3.1% higher than that of fiscal year 2012. The budget primarily supports life-saving and job-supporting services for American communities, including infrastructure investments, as well as science and research. NOAA provides data to support marine commerce, promote the sustainable use of ocean resources, and provide accurate weather and climate forecasting. The NOAA budget is divided into two primary accounts: Operations, Research and Facilities (ORF) and Procurement, Acquisition and Construction (PAC) which together make up more than 98% of the agency's fiscal year 2013 appropriation.[7]

NOAA Priorities

NOAA has generated a Next Generation Strategic Plan to assess the highest priority opportunities to build and promote the resiliency of ecosystems, communities, and the economy. NOAA has established several priorities, all of which will be dependent on a strong science and technology and management enterprise in the years ahead. The principal priorities established by the administration in 2013 include:

***Climate Adaption & Mitigation*:** Improved scientific understanding of climate change, including a "climate-literate" public will be critical to assess future impacts and inform decisions.

***Weather Preparedness*:** Increased and improved capacity to track and predict weather events will result in reduced loss of life and property.

[7] NOAA. "FY 2013 Budget Summary." February 13, 2012.

Resilient Coastal Communities and Economies: Resilience of coastal communities and economies is dependent on ocean and coastal planning and management. Safety and efficiency in marine transportation and improved coastal water quality are critical focus areas in the years ahead.

***Healthy Oceans*:** To promote healthy ocean ecosystems, NOAA efforts will focus on improved understanding of those ecosystems. The sustained recovery and protection of native species and their habitats are essential to maintain the health of these ecosystems, rebuild fisheries, and promote safe seafood.

In the coming years, NOAA will maintain its commitment to Navigation Services and stewardship of coastal zones. The agency has also made targeted new investments including the development of marine sensors to detect and sample biological and physical parameters at various spatial and temporal scales in oceans, improved capacity to conduct natural resource damage assessment activities, and research on harmful algal blooms, hypoxia, and ecosystems.

As of AAAS's analysis in September 2012, an equal allocation sequestration scenario at NOAA would have resulted in $218 million in cuts to R&D over the next five years (7.6%) in addition to cuts and budget caps to be imposed by the Budget Control Act of 2011. If only nondefense discretionary accounts were to face sequestration, NOAA would experience $505 million in cuts of this nature over the same period of time, or 17.5% of its budget.[8] Due to adjustments to the sequester by the American Taxpayer Relief Act, across-the-board budget cuts at nondefense discretionary agencies have been reduced to 5.1% for the 2013 fiscal year. However, as these cuts have been implemented nearly midway into the year, they are functionally equivalent to a 9% reduction according to OMB estimates.

Climate and Weather Services

Thomas Karl, director of the National Climatic Data Center in Ashburn, N.C., described NOAA's weather predicting capacity. Leading scientists and meteorologists, including those at the National Climatic Data Center, have observed changes in the drivers of climate change including solar radiation, greenhouse gases, and aerosols. Karl asserted that the geological context provided by readily available paleoclimate records clearly shows that human activity has drastically affected our atmospheric resources. These effects will result in massive changes to climate, and adaptation will require significant innovation and restructuring.

The most immediate and expensive consequences of our changing climate are the increased frequency and severity of extreme weather events. In the years ahead, variations and changes in weather due to a changing climate will become more pronounced and unpredictable. It will be necessary to maintain and expand the satellite infrastructure. Billion-dollar weather and climate disasters in the U.S. range from drought and heat waves to winter storms and crop freezes to flooding and wildfires. They affect all parts of the nation and represent significant cost to the towns and regions affected. Although no one severe weather event can be attributed to climate

[8] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.

change, all storms now occur in a changed context, one that requires extensive study and research. In the coming years, feedback between heat and drought are likely to amplify the extremes of both in the U.S. More significant extremes in maximum and minimum temperature, drought, and precipitation will occur.

NOAA has established a number of programs to connect a changing climate to individuals within the U.S. In 2008, NOAA's Coastal Services Center launched the "Digital Coast" initiative to address timely coastal issues like climate change. One of the tools within the program, the Sea Level Rise Impacts Viewer, creates visualizations of the potential physical, ecological, and socioeconomic impacts of sea level rise to inform planning efforts.

As our environment becomes increasingly erratic and unpredictable, NOAA's satellite and weather tracking services will be essential.

NOAA information and services are critically important to all levels of government and in the daily lives of Americans. Local governments in coastal states rely on NOAA data to account for sea level rise in community planning and updates to infrastructure. As our environment becomes increasingly erratic and unpredictable, NOAA's satellite and weather tracking services will be essential. Reducing NOAA's ability to predict large storms early will result in preventable deaths and expensive repairs.

Environmental Protection Agency (EPA)

EPA's requested budget for the 2013 fiscal year was $8.344 billion, $105 million below that of the previous year.[9] Fiscal constraints and program cuts have significantly slowed the progress of the agency toward performance measures established in its fiscal year 2011-2015 strategic plan. EPA objectives and oversight domains are at risk due to insufficient funding for air and water quality, regulation of greenhouse gases, and state and tribal partnerships. Where possible, the agency has expanded or established new partnerships with other federal agencies. In response to diminished funding, EPA has reprioritized its resources and adjusted spending to reflect emphasis on problems of the future and the elimination of mature programs that have mostly accomplished their goals.

EPA Priorities

EPA has not released a budget request for the 2014 fiscal year. In the absence of a direct statement, it is difficult to ascertain specifically how the agency will react to budget cuts in the coming years. This uncertainty is worsened by the threat of a fully implemented sequester. Examining past funding priorities that were most critical to EPA's mission suggest future priorities. EPA's 2013 budget request identified the following priorities:

[9] U.S. EPA Office of the Chief Financial Officer (2710A). "Fiscal Year 2013 EPA Budget in Brief." Publication No. EPA-190-S-12-001. February 2012.

***Supporting State and Tribal Partners*:** Funding for State and Tribal Assistance Grants (STAG) represents the largest percentage of EPA's fiscal year 2013 budget request – 40%. State and tribal EPA partners are the primary implementers of environmental programs on the ground. These grants reaffirm EPA's commitment and support for state programs that rely on federal funding.

***Improving Air Quality and Climate Change*:** The most ubiquitous sources of air pollution are motor vehicles and their fuels. EPA works to establish new fuel and national emissions standards to reduce air pollution and educate consumers about the effects of their actions on the environment. Also emphasized are approaches to reducing greenhouse gases and the risk climate change poses to the environment, property, and to human health.

***Protecting America's Waters*:** EPA continues to address point- and non-point source pollution in at-risk regional areas, as well as urban waters, estuaries, and wetlands. Targeted initiatives include the Great Lakes Restoration Initiative and the Chesapeake Bay program.

***Sustainable Water Infrastructure*:** As part of the administration's long-term strategy, EPA is working to implement a Sustainable Water Infrastructure Policy focusing on working with states and communities to enhance financial, managerial, and technical capacity as a means to meet local needs and enhance performance and efficiency. Infrastructure improvement projects will ensure that water is safe to drink.

***Protecting the Land*:** Funding for the Superfund program is being maintained at the level necessary to respond to releases of hazardous substances and control human exposure and migration of those substances.

***Ensuring the Safety of Chemicals*:** Funding is directed toward chemical safety, increasing support for the reduction and assessment of chemical risk, and maximizing the availability of public information on harmful chemicals.

***21st Century Enforcement*:** This priority reflects EPA's efforts to transform enforcement and compliance capacity via investments in new technology such as e-reporting and more advanced monitoring tools.

***Expanding Partnership with Other Federal Agencies*:** EPA is working with partners throughout the federal government to leverage resources and avoid duplication of efforts.

***Priority Science and Research*:** Science and research are the foundation of work at EPA. In fiscal year 2013, EPA is refocusing resources to support a Center for Innovative Estuarine Approaches and to advance efforts in lifecycle chemical safety and sustainable molecular design. The Center will work to develop innovative science and technical solutions to inform policies, management structures, and business approaches. These innovations will promote the sustainability of coastal watersheds and estuaries. EPA will additionally build on current research on potential impacts of hydraulic fracturing on drinking water.

***Eliminations and Efficiencies*:** In recognition of limits on discretionary spending across government programs, EPA has directed fiscal year 2013 resources to meet the agency's highest

priorities and critical needs. A number of programs have been eliminated in the fiscal year 2013 president's budget including the Clean Automotive Technology Program, Beaches Protection categorical grants, Environmental Education, State Indoor Radon Grants, the Support to Other Federal Agencies program within Superfund, and the Fibers Program.

EPA Budget Trends

As of AAAS's analysis in September 2012, an equal allocation sequestration scenario at EPA would have resulted in the loss of an additional $213 million in R&D funds for the next five years, a 7.6% cut. Had the sequester been modified to impact only nondefense discretionary programs, these cuts would have increased to $494 million, or 17.5%.[10] In response to proposed budget cuts under the sequester, Lisa Jackson, the now-former EPA Administrator, testified before the Senate that "it will be impossible for [EPA] to manage cuts of that magnitude and still achieve [its] fundamental mission to protect human health and the environment."[11]

Sequestration has since been triggered. Due to adjustments to the sequester by the American Taxpayer Relief Act, across-the-board budget cuts at nondefense discretionary agencies have been reduced to 5.1% for the 2013 fiscal year. However, as these cuts have been implemented nearly midway into the year, they are functionally equivalent to a 9% reduction according to OMB estimates.

The sequester will have a devastating impact on EPA's ability to fund enforcement of public health and environmental protection programs funded by the Agency's operating budget. State and local governments will no longer be able to finance drinking water and wastewater projects that provide safe and clean water to communities. EPA grants to help states carry out basic functions that protect human health and the environment, including water quality permitting and air quality monitoring will be slashed. Additionally, the progress of our nation's ability to clean up hazardous waste sites will be significantly impaired, to the detriment of our land and water resources.

"It will be impossible for [EPA] to manage cuts of that magnitude and still achieve [its] fundamental mission to protect human health and the environment."

—Lisa Jackson,
EPA Administrator

[10] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.

[11] "Testimony of Lisa P. Jackson, Administrator, U.S. Environmental Protection Agency, Before the Committee on Environment and Public Works, U.S. Senate." March 22, 2012.

Department of the Interior (DOI)

Activities and Priorities

DOI is steward to 20% of federal lands including national parks, wildlife refuges, and other public lands. It is the largest supplier and manager of water in the western states. It upholds federal trust responsibilities to Indian Tribes and Alaska Natives. Additional responsibilities include the conservation of migratory wildlife and endangered species; historic preservation; the protection and restoration of surface-mined lands; mapping; and geological, hydrological and biological science for the nation. These responsibilities serve the dual purpose of protecting the nation's resources and ensuring equity and responsibility in their use. A number of agencies and bureaus within the department are responsible for the specialized protection and management of our natural resources, including the National Park Service, Fish and Wildlife Service, Bureau of Land Management, Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement, U.S. Geological Survey, Bureau of Reclamation, and Office of Surface Mining.

An equal allocation sequestration scenario at DOI would result in a decrease of 7.6%, or $299 million in R&D over the next five years. USGS will absorb $253 million of this cut.

DOI's primary mission areas include powering America's economy through the responsible use and development of natural resources, growing the economy outdoors by promoting travel and tourism, spurring growth and innovation through science via investments in R&D to improve strategic mineral supplies, water use and availability, and natural hazard preparedness, delivering sustainable growth through water reclamation and management, and encouraging economic development in Indian Country and honoring Trust responsibilities.

DOI Budget Trends

In the 2013 fiscal year budget request, DOI requested approximately $11.5 billion to support department mission areas and agencies, essentially level with the enacted budget from fiscal year 2012. [12] As of AAAS's analysis in September 2012, an equal allocation sequestration scenario at DOI would have resulted in a decrease of 7.6%, or $299 million in R&D over the next five years. USGS would absorb $253 million of this cut. In a nondefense discretionary-only sequester, DOI's R&D budget would decrease by 17.5%, or $692 million over the next five years, $587 million of which would be deducted from USGS's budget.[13] Due to adjustments to the sequester by the American Taxpayer Relief Act, across-the-board budget cuts at nondefense discretionary agencies have been reduced to 5.1% for the 2013 fiscal year. However, as these cuts have been implemented nearly midway into the year, they are functionally equivalent to a

[12] "Fiscal Year 2013, The Interior Budget in Brief." February 2012.

[13] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.

9% reduction according to OMB estimates. Cuts at sub-agencies within DOI will have been adjusted accordingly.

To promote the sustainable stewardship of our nation's natural resources, it is critical to maintain strong investments in natural science R&D.

Federal Agency Remedies

Natural resources management and science agencies have begun identifying options and implementing measures to cut spending in response to sequestration. These measures focus primarily on promoting efficiency and eliminating non-essential program costs but will cover only a fraction of the anticipated cuts. Federal agencies and their proponents also have increased communications to Capitol Hill and the public—describing the federal programs at risk as effective, efficient and necessary.

Margaret Davidson, acting director of the Office of Ocean and Coastal Resource Management at NOAA, identified some areas where federal agencies can concentrate efforts to limit inefficiency and maximize program output and visibility. Jurisdictional overlap and fragmentation of information and programs among agencies, for example, results in inefficiencies as well as funding and branding issues.

Davidson discussed how multiple federal agencies sometimes have jurisdiction over a particular natural resource, causing program duplication or the appearance of same. This causes challenges during the development of appropriations for these agencies. Davidson advocated the promotion of dialogue among agencies with shared or similar missions to define their ecosystem niches and establish those niches in ways that are complementary. Through improved communication and cooperation, agency administrators and directors could present a more unified front to budget authorities who might otherwise diminish their program capacity piecemeal.

Davidson provided an example of an issue resulting from multijurisdictional responsibilities for the coasts. She cited mapping as a major frustration in the ocean and coastal resources management area. Although NRCS, FEMA, Army Corps and NOAA all have mapping budgets and a need to map the ocean, all of our nation's coasts have not been mapped. For example, rather than combining resources and mounting multiple sensors on the body of a shared aircraft, each agency collects its own data separately. Hundreds of millions of dollars are spent on mapping but we have not established an integrated coastal mapping system. As a result, our coastal maps are markedly antiquated and extrapolated and do not cover the range necessary for a complete image of the continental shelf. Extrapolation can result in meaningless and dangerous inaccuracies. She speculated that the risk of loss posed by tsunamis to the southeast U.S. has been greatly understated.

In this new fiscal environment, it is critical that agencies with common purposes and resource concerns come together to jointly improve programs and capabilities in a unified and systematic manner. Current budgetary pressures will lead to improved cooperation among agencies, particularly with regard to monitoring and data collection activities. New priorities, including

diversification, increased interdisciplinary science, and interagency cooperation must be promoted throughout the federal government.

Tracy Mehan, former EPA Administrator for Water, stressed the importance of public-private partnerships to facilitate mutual learning and the mobilization of resources. Technical managers must actively engage with the public, stakeholders, and NGOs to promote, support, and achieve common goals. These partnerships enhance the political and social legitimacy of environmental issues and enable ground-up support for both local and national sustainability initiatives. He discussed watershed-based green infrastructure initiatives as a foundation for local engagement in natural resource conservation issues. Such initiatives enable individuals to reinvent the watershed as a social reality beyond the traditional hydrogeological perspective. According to Mehan, "environmental and resource managers must focus on the fundamentals to cope with the realities of limited money, staff and political capital. They will have to use their imagination and ingenuity to engage their stakeholders and potential new partners through effective deliberations, integrating the knowledge, insights and resources of all."

Funding Science at Universities

Scientists everywhere are concerned about the impacts of sequestration and long-term budgeting on research funding. Federal agency budgets do not just allocate funding for research ventures within their own organizations; they provide grants to scientists and investigators in universities and private research institutions throughout the nation.

In 2011, national R&D expenditures were estimated to be $414 billion across all sectors. Universities and colleges conducted $63.1 billion (15.2%) of U.S. R&D in that year. This total has increased by several billion dollars each year since 2006 with an annual growth rate of approximately 5.2%—well ahead of the rate of total national R&D.[14] As a share of the economy, R&D at federal agencies is 16.7% smaller than it was a decade ago and 29.7% smaller than it was in the 1970s.[15] This trend is partially due to significant growth of private sector R&D, but also because regular appropriations for R&D funding remaining flat or declining.

Private R&D efforts constitute a vital component of our nation's innovation enterprise. However, the majority (approximately 75%) of private R&D is focused on latter-stage product development and near-term profit. Public R&D efforts, particularly in the nondefense sector, are much more focused on basic and applied research, which requires a longer-term investment strategy and higher tolerance for risk. The lack of federal funding for this brand of research will mean fewer investments in the pursuit of fundamental knowledge and applications.

This decline in public research spending reflects poorly on the nation's international competiveness, which is commonly measured by research intensity, measured as R&D expenditures as a share of GDP. President Obama has set a goal of attaining a nationwide R&D intensity of 3% by 2020. As of 2009, U.S. R&D intensity was 2.9%. Given the rise of private industrial R&D, near-term reductions of public R&D will not have as drastic an impact on national intensity as they might have in years past. However, such cuts on 25% of national R&D spending will set the nation counter to investment trends seen elsewhere in nations like South Korea, China, and Taiwan.[16]

David Blockstein, executive secretary of National Council on Science and the Environment's (NCSE) Council of Energy Research and Education Leaders, and Council of Environmental Deans and Directors (CEDD), discussed trends in university funding for environmental management, science, and conservation programs. The National Science Foundation, source of a large number of university research grants, has remained a growth area for the past two decades. Over the

[14] Hourihan, Matt. "Brief: Federal R&D and Sequestration in The First Five Years." AAAS. September 27, 2012.
[15] ibid.
[16] ibid.

past ten years, an increasing majority of NSF's budget has been dedicated to research and related activities, primarily competitively awarded university-based research.

In a data release from January 2013, NSF indicated that this recent growth was not enough to prevent a decline in national R&D intensity. "Although U.S. total R&D expanded by 0.7% between 2009 and 2010 and by 1.8% between 2010 and 2011," the report indicates, "these rates were well behind the pace of GDP expansion in both of these years (4.2% and 3.9%, respectively.)"[17] Overall R&D funding in the U.S. has in fact declined by approximately 10% over the past few years when adjusted for inflation.[18] According to the Organization for Economic Cooperation and Development, U.S. research intensity fell from 2.91% in 2009 to 2.83% in 2010. In 2011, this measure of R&D expenditure as a share of the U.S. economy fell to 2.77%.[19]

Overall R&D funding in the U.S. has in fact declined by approximately 10% over the past few years when adjusted for inflation.

Blockstein observed that within universities, environmental and sustainability academic programs have seen great increases in availability and enrollment. At four-year higher education institutions in the U.S., the number of these programs has increased approximately 40% in the past four years due to need and student demand, and in spite of economic limitations. The largest domains moving forward are climate and energy, unprecedented and critical domains that must be substantially addressed within the next century. Limited growth of R&D funding and increased demand for university programs has caused increased competition and scrutiny of funds to compensate for lack of resources.

To address trends toward scarcity in grant availability, a number of innovations have arisen within the university system to combat increased competition to the benefit of the researchers themselves and the scientific communities they support.

[17] Boroush, Mark. "U.S. R&D Spending Resumes Growth in 2010 and 2011 but Still Lags Behind the Pace of Expansion of the National Economy." NSF 13-313. January 2013.

[18] AAAS Policy Alert. January 9, 2013.

[19] Organization for Economic Cooperation and Development, Directorate for Science, Technology and Industry. Main Science and Technology Indicators. January 18, 2013.

University Priorities

As a result of a number of factors including societal priorities, financial outlooks, and scientific consensus, a number of priorities have arisen in university administrations. It is these priorities that will drive most funding for research at both the academic and professional levels. They include:

- Promoting sustainable economic growth and job creation;
- Defeating the most dangerous diseases and achieving better health outcomes
- Moving toward a clean energy future;
- Understanding, adapting to, and mitigating the impacts of global climate change;
- Managing competing demands on natural resources, based on sustainability and biodiversity; and
- Developing the technologies to protect our troops, citizens, and national security interests.

The Obama Administration agenda on climate and energy has focused on energy independence and the economic and security benefits derived from that status. This commitment and the pressing social and economic issues that led to it, likely will sustain climate and energy as the largest research domains moving forward for the foreseeable future. It is important to note, however, that these popular research areas encompass far more disciplines than their names suggest. Related issues that will need to be researched in conjunction with renewable energy sources include water issues, livelihood issues, ecological restoration, extreme events, disaster preparedness, security, health effects of energy choices, vulnerable populations, adaptation, alternative energy and conservation, and sustainability.

University research programs have shifted to address this trend toward interdisciplinary science. Grant programs emphasize collaborative research and big science aided by sensing and computing technology. Research led by a single researcher is no longer common or competitive in academia due to a universal drive toward interdisciplinary collaboration and competition for scarce grants. Collaborative interdisciplinary research is a solution to funding restrictions and an important and necessary response to interdisciplinary issues.

Environmental issues of the 21st century are multifaceted and complex. Their solutions require cross-disciplinary and problem-orientated research efforts. They also require integration of social sciences, and the translation of science into policy. It is critical that support be provided to scientists and engineers who have tasked themselves with solving these issues. However, scientific breakthroughs are impossible without investments. New research ventures must have funding to get started and long-term projects must have the ability to be renewed. Without a continuity of investment in science, the U.S.'s scientific capacity will become stagnant and weak.

Land grant and comprehensive universities throughout the West are looking to the DOI, USDA, EPA, NASA, and NOAA to support the next generation of research. However, budgets are declining rapidly. Research competition poses a difficult challenge for young investigators. While established scientists have taken measures to downsize their research programs and cooperate to increase grant competitiveness, younger, less established scientists are struggling. Assuming

that they are able to have a proposal funded, they must struggle with a shoestring budget or face the reality of having to quit the field. It is critically important that federal resource management agencies continue to provide support for research funding to develop younger faculty. Not doing so will result in a gap in knowledge and scientific ingenuity in the next generation.

In response to declining federal support, many universities have shifted focus to alternate funding sources like industry. Further restrictions to scientific funding at the federal level will negligibly decrease our overall deficit while significantly decreasing our global competitive standing. The need to reduce the national debt is real but it should not be achieved by sacrificing investments in science that protect public safety, create jobs, and support the nation's international competitiveness.

Further restrictions to scientific funding at the federal level will negligibly decrease our overall deficit while significantly decreasing our global competitive standing.

State and Regional Impacts

Federal agencies, universities and private research organizations are not alone in facing fiscal stringencies. State and regional natural resource agencies have been cutting budgets since before the arrival of the Great Recession. Now more cuts are being implemented in anticipation of the loss of federal funds and grants. Despite the U.S.'s rich history of establishing progressive natural resource management and science programs, such programs are often the first to suffer in the face of budgetary stress or political pressure.

Regional, state, and local environmental programs rely on federal funding to relieve stress of local economies. Support from federal agencies enables communities to maintain public spaces; monitor the quality of natural resources including air, drinking water, and beaches; and maintain a civilian workforce capable of implementing and monitoring valuable programs. Declining budgets will result in layoffs, health and environmental degradation, and damage to local economies reliant on sponsored programs.

State and regional natural resource agencies have been cutting budgets since before the arrival of the Great Recession. Now more cuts are being implemented in anticipation of the loss of federal funds and grants.

As the capacity of federal agencies to provide support diminishes, these agencies are challenged with prioritizing and restructuring programs and securing alternate funding. Unfortunately, local governments that would normally support these agencies in the absence of federal support are themselves facing significant economic pressures and are unable to fill the void.

Regional organizations in particular have been suffering during this period of fiscal stringency. These multijurisdictional agencies are subject to the whims, priorities, and financial limitations of their collaborators. The failure of one supporting party to honor its share of the budget can lead other parties to do the same.

The Delaware River Basin Commission (DRBC)

The DRBC has faced tremendous financial pressures for over a decade. **Carol Collier**, executive director of DRBC, discussed how the commission has been coping.

The Delaware River Watershed provides drinking water for over 15 million people, or about 5% of the population of the U.S. with 8.7 billion gallons drawn per day. The watershed is comprised of four states, 25 congressional districts, 42 counties, and 838 municipalities.[20] In this region, the

[20] Delaware River Basin Commission.

DRBC maintains authority for water quality protection, water supply allocation, permitting, water conservation, watershed planning, drought management, flood-loss reduction, and recreation oversight.

When first established in 1961, the DRBC was a breakthrough in water resources management. For the first time, the federal government and four states (Delaware, New Jersey, Pennsylvania and New York), created a regional governing body with the authority to regulate an interstate river system. While the commission acts as a regulatory authority, Collier says that its greatest value is that it "serves as the coordinator of holistic watershed management and provides a forum to adapt policies and management strategies as issues change."[21]

When the commission was established, each signatory was allocated a fair-share portion of the commission's operating budget. Allocations were as follows:

- Delaware 12.5%
- New York 17.5%
- New Jersey 25%
- Pennsylvania 25%
- Federal Government 20%

In 1996, at the direction of the U.S. Congress, the federal government ceased to contribute its 20% share. Since then the federal government has contributed its share of funding once, in 2009 via the Omnibus Appropriations Bill signed by President Obama. The cumulative federal shortfall from October 1996 to June 30, 2012 totals $9,994,250.[22] The four states continue to make monetary contributions. However, for several years, New York and Pennsylvania have not met their share. To prevent financial collapse, the commission's budget has remained stagnant for several years despite rising costs of delivering services. The commission's objectives have suffered as a result.

The DRBC is an example a federal-state partnership that has fallen short of its objectives when the federal government has withdrawn support. In fiscal year 2014, DRBC anticipates that states will continue to fail to meet their agreed upon contributions and continue to decrease payments. The commission anticipates incurring a $1 million deficit by 2014. Reduced funding will result in diminished flood-loss reduction efforts and monitoring of tidal tributaries, leading to an inability to adequately address floods and oil spills. To reduce operational losses, DRBC anticipates incurring large staff reductions in the future. Flood losses and pollution will increase while water quality deteriorates, education and public outreach initiatives suffer, and water withdrawal management functionality degrades. There is no solution in sight.

[21] Statement of Carol R. Collier, P.P., AICP, Executive Director of Delaware River Basin Commission before the Subcommittee on Water Resources and Environment Committee on Transportation and Infrastructure, United States House of Representatives, on Comprehensive Watershed Management and Planning. June 24, 2008.
[22] Delaware River Basin Commission.

Where do we go from here?

Significant funding cuts engineered and guaranteed by the sequester and Budget Control Act of 2011 will severely inhibit the ability of federal management, regulatory, and science/research agencies to perform their missions now and for years to come. This is happening at the end of a decade that has already witnessed stagnant and declining funding for the environment and science.

The current approach to deficit reduction discards informed and nuanced decisions about funding priorities and replaces them with an anti-intellectual meat cleaver approach. Deleterious impacts will be felt throughout the management and scientific communities, including programs of state and local governments, and universities.

This unfortunate fiscal process is unfolding although a succession of public polls have shown that people highly value environmental quality and are willing to pay more to protect it. There is a disconnect between actions of some of the elected and desires of the represented.

The environmental challenges faced today are multifaceted, complex and pervasive—qualitatively new and unprecedented. The U.S. cannot allow its research and science infrastructure to become outdated if it is going to meet these challenges. We are facing new and evolving environmental problems including climate change, extreme weather events, invasive species, emerging contaminants, growing scarcity of traditional energy sources, a growing and changing population, and stressed ecosystems. The nation must promote interdisciplinary and interagency programs to unite common interests and maximize program efficiencies. We also must promote scientific literacy in all Americans to enhance appreciation of what must be done to preserve ecosystem services which in turn benefit our economy, our communities, and our families.

Margaret Davidson closed her presentation stating ". . . we will, by intention or default, make some very fundamental changes to the role of the federal government in our daily lives." We are likely at a turning point in our relationship with our environment. Federal agencies foster its protection and maintenance, both nationally and locally. It is essential that we now proceed with full knowledge of the importance of programs at risk lest we allow shortsighted fiscal decisions to cause irreparable damage to our environment and scientific infrastructure.

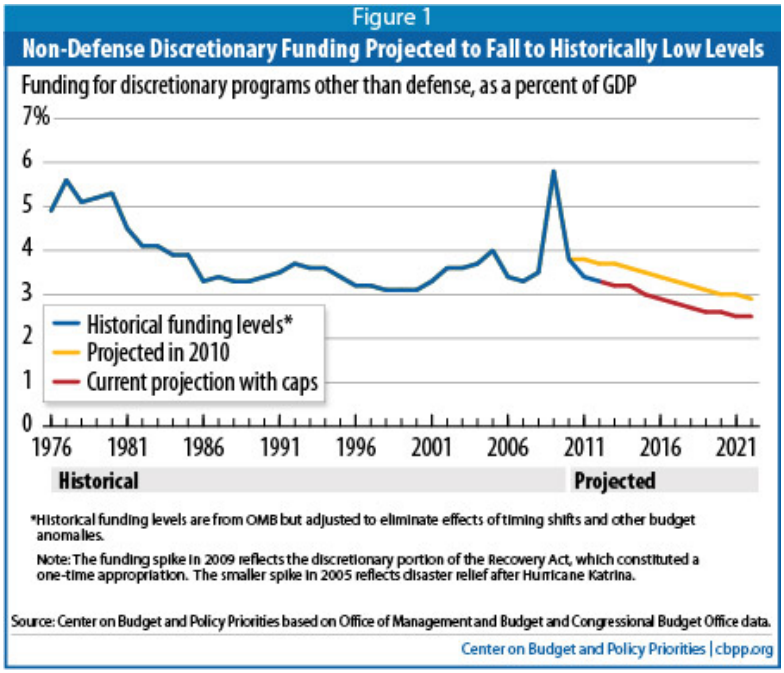
Appendix A: The Current Fiscal Climate

During the debt ceiling crisis of 2011, congress passed the Budget Control Act of 2011 (BCA) which raised the debt ceiling by $2.4 trillion over two years, preventing a government shutdown. At the same time, in the interest of promoting deficit reduction measures, Congress passed multi-year spending caps for defense and nondefense discretionary spending, producing $1.5 trillion in cuts in discretionary spending for fiscal years 2013 through 2022. These caps will keep discretionary spending essentially flat at these reduced levels over the next ten years when adjusted for inflation.

The BCA does not identify specific program funding cuts. Instead, specific limits are identified for defense and nondefense funding. Congress is responsible for the allocation of spending to specific programs within these sectors via appropriations. Three-fifths of the $1.5 trillion in cuts and statutory caps on appropriations will come from reductions in nondefense discretionary programs. These reductions will diminish nondefense discretionary spending to its lowest level on record as a share of GDP since 1962.[23] Limits on overall discretionary spending over the next ten years will reduce federal spending by over $841 billion. If congress were to appropriate spending exceeding the limit for a particular year in either defense or nondefense, across-the-board sequestration would be initiated to eliminate the breach in spending within that category.

With authority under the BCA, congress formed a Joint Select Committee on Deficit Reduction to identify an additional $1.2 trillion in deficit reductions over the next decade. Bipartisan majorities in the house and senate voted for the threat of sequestration as a mechanism to force congress to act on further deficit reduction in the event of failure of the joint select committee. Sequestration would trigger automatic cuts divided equally over defense discretionary and nondefense discretionary spending and amount to the required $1.2 trillion in savings while ultimately crippling Republican and Democratic

Figure 1



[23] Kogan, Richard. "Congress Has Cut Discretionary Funding by $1.5 Trillion Over Ten Years: First Stage of Deficit Reduction Is in Law." Center on Budget and Policy Priorities. November 8, 2012.

spending priorities. The threat of harmful across-the-board cuts to defense and nondefense programs was intended to drive Democrats and Republicans to reach a compromise by November 23, 2012. In fact the administration never intended to implement the sequester; it is universally considered a bad policy, described as blunt and indiscriminate. However, congress did not come to agreement by the required deadline, so the sequester was to be implemented on January 2, 2013.

Following weeks of terse negotiations, congress passed legislation to avert large income taxes on most Americans and prevent the 2013 sequester, at least temporarily. On January 1, 2013, the House of Representatives voted to pass a senate bill, the American Taxpayer Relief Act of 2012, postponing sequestration measures until March 1, 2013. Under this bill, sequestration is reduced to $85 billion for the current year. Future years will experience $109 billion in cuts. This delay will be paid for with an equal mix of spending cuts and new revenue: base discretionary spending will be cut by an additional $12 billion over the next two years ($4 billion in fiscal year 2013 and $8 billion in fiscal year 2014), distributed evenly between defense and nondefense accounts.[24] These additional cuts will be allocated strategically by the administration and congress, rather than the blind approach dictated by the sequester.

The March 1 deadline passed without congressional action, so the sequester was implemented. Budget reductions under this mechanism will continue until the end of the fiscal year on September 30, 2013. Until that time, congress has the power to replace across-the-board cuts with targeted cuts and/or increases in revenue.

Despite the two-month reprieve and reduced sequestration rate, natural resource and conservation agencies are at the edge of financial shortfall. Overall budgets at environmental management agencies have been decreasing for years due to congressional appropriations and have remained stagnant at best for decades. Financial outlooks appear grim for these agencies in spite of their critical programs that benefit all Americans. Delaying the implementation of the sequester means that a smaller portion of funding for the 2013 fiscal year will be available to absorb the cuts.

Current estimates and classifications are preliminary; the exact results of sequestration will differ based on legal, budgetary, and technical analysis. However, it will currently result in a 5.1% reduction in non-exempt nondefense discretionary funding and 5.3% reduction to other non-exempt nondefense mandatory programs.[25] These rates were reduced from 8.2% and 7.6%, respectively, with the enactment of the American Taxpayer Relief Act. However, as these cuts have been implemented nearly midway into the year, they are functionally equivalent to a 9% reduction according to OMB estimates. According to OMB reports, the percentage of cuts and identification of accounts "reflect the requirements of the laws that the administration is applying… the administration cannot choose which programs to exempt or what percentage cuts to apply.[26]"

[24] AAAS Policy Alert. January 9, 2013.

[25] Senator Patty Murray. Memo. January 24, 2013.

[26] OMB Report Pursuant to the Sequestration Transparency Act of 2012 (P.L. 112-155)

Appendix B: America's Historic Role in Conservation Management and Science

Mark Madison, national historian for the U.S. Fish and Wildlife Service, spoke about environmental challenges of the future and our capacity to address the needs of federal agencies to characterize and solve these challenges. Madison asserted that historically, the U.S. has been a leader in conservation management and science. However, the question of do we remain a leader and will we remain a leader remains unclear.

Early Americans achieved their role as pioneers of conservation leadership by first destroying the American environment. By the mid-1800s, America's soils, forest, and fisheries were suffering in the eastern half of the U.S. In this century, however, Americans' perception of their environment and their role as stewards of the land and wild creatures experienced a dramatic shift. Americans began to realize that their resources were not inexhaustible and a new ethic arose to preserve, improve, and wisely use remaining resources.

Federal intervention in the nation's lands continued to grow at a modest rate until the environmental disaster of the Dust Bowl in the 1930s, which escalated federal control over nature. Under the New Deal, the Civilian Conservation Corps was established to restore natural resources and promote economic recovery. Between 1933 and 1945, more than 2.5 million youths worked on forests, parks, refuges, and private lands. During this decade of conservation innovation, the Pittman Robertson (Federal Aid) Act of 1937 was launched. The act provided new funds to establish wildlife by charging a small excise tax initially on hunting equipment and later on fishing gear to support primarily state wildlife efforts.

Madison asserted that this new policy of enacting taxes to support wildlife and natural resource conservation efforts was pivotal for two reasons: first, it provided funds to state conservation efforts whose budgets had previously been raided

Theodore Roosevelt, one of our nation's greatest conservationists, popularized the idea that America's natural resources belonged to all of the American people and not just a greedy few. This North American Model of Wildlife is considered unique to our continent:

1. Wildlife belongs to the American public
2. Market and commercial hunting is banned
3. The allocation of wildlife is by law, now power, wealth or position
4. Under the law, every citizen has an equal opportunity to hunt and fish
5. Wildlife can be killed for food, fur, self-defense or property protection. Frivolous use is not acceptable
6. Wildlife is an international resource and should be managed as such

Scientific management is the cornerstone to maintain viable populations

whenever a state deficit emerged, and second, they established a precedent for requiring the user of a resource to pay to maintain it.

The modern environmental movement is vastly different from the conservation movement of the 19th century. While the conservation movement was utilitarian in nature, focusing on species or landscapes of use or interest to humans with a focus on natural resources, the environmental movement has expanded protection to all facets of the natural world. It encompasses and accounts for the dangers of toxins to human and non-human health and promotes restraint and modesty in nature.

However, the environmental issues we face today are far more complex and global than any we have faced in our history as Americans and members of the global community. We cannot continue to follow historic patterns of overuse and degradation, or continue to adopt reparatory policies to address past failures. The economic, industrial, and ecological demands of our time require interdisciplinary collaboration, local support, a strong R&D sector, and a supportive federal government that embraces a precautionary approach to global environmental issues.

The environment is dynamic, so we must be too. It is essential that we build on the successes of the past to guarantee future safety and prosperity for our nation. Without clean air and water, and healthy land to live and grow food on, our nation's health and economic stability will suffer. There is a misperception that a clean environment and strong economy are mutually exclusive — that it is more important to generate record profits in industry than preserve our natural resources. In order to support future generations and guarantee them a quality of life at least equal to our own, it is critical that the environment be elevated from its current status as a second or third-tier priority.

Appendix C: Polls Show Public Support

Federal funding for environmental management and conservation science is not responsible for the current federal budget deficit. Further cutting programs that support these activities will not solve our nation's financial troubles. Despite targeted fiscal pressure, agencies like the Environmental Protection Agency, National Oceanic and Atmospheric Administration, Fish and Wildlife Service, U.S. Department of Agriculture, U.S. Geological Survey, and National Science Foundation are the subject of significant and bipartisan public support.

The Nature Conservancy, an international conservation organization, conducts periodic nationwide opinion polls to gauge public sentiment on political and environmental issues. **Robert Bendick**, director of U.S. Government Relations at TNC, spoke about one such poll, conducted by Public Opinion Strategies and FM3, in June 2012. Regardless of political affiliation, the poll found that Americans expressed broad support for protection of our nation's natural resources and indicated that stewardship of public lands is one of the things our government does best. Themes that arise from this poll indicate that conservation is regarded as patriotic. Voters do not believe that a healthy environment and strong economy are mutually exclusive. They reject current cuts to current conservation program funding even in the context of the budget deficit. American voters believe that government has an essential role in conservation and they are willing to be taxed to support these efforts.

The opinion poll also noted that, while individuals recognize the urgent need to preserve clean and abundant natural resources, when it comes to national elections, a strong economy is considered more important than the maintenance of these basic needs. Unfortunately, this represents a misreading of the public regarding the value of nature. A healthy environment and a strong economy are not mutually exclusive. In fact, one can assert that they are codependent. Just as a strong economy and healthy environment come hand-in-hand, so too do economic and environmental disaster. Cases on point — the Dust Bowl and Great Depression of the 1930s.

Local conservation ballot measures in the 2012 election experienced strong bipartisan support. Eighty-one percent of conservation finance measures were approved nationally. Support for the environment is strong enough across the political spectrum that conservation appears to be one area that could offer a foundation for bipartisan cooperation given proper attention and education. Unfortunately, there is a severe disconnect between what people think, how legislators vote, and perceptions of the partisan split in congress.

To promote conservation initiatives and maintain support for natural resource management agencies, RNRF's congress speakers and delegates asserted that it is critical to connect people's way of life with the environment, and stress the importance of conservation to their daily lives. If one can remove science and ecology from the abstract and enable individuals to draw connections between natural resources and their families and communities, one could expect to see the rise of significant political momentum. This momentum can be applied to promote clean

air and water and land preservation initiatives for the health and economic benefit of local communities and ecosystems.

To bring about change in the years ahead, it will be necessary to reassess the way that we communicate the science behind the environment. Environmentalists and conservationists are not doing enough to reconcile the environment and the economy to demonstrate the value of nature to society. At the same time, special interests have been able to exert undue influence on the legislative process through contributions, lobbying and marketing. The combination of undue pressure from special interest groups and fiscal and economic problems enables indirect attacks on environmental and conservation programs. It is critical to recognize the threat to natural resources represented by underfunded and understaffed management agencies, and connect that threat to the daily lives of the public. The importance of environmental programs and the universality of our atmosphere and watersheds must be properly communicated to and understood by local communities. If the global consequences of local issues can be embraced, the environmental community will experience a fundamental revitalization on a national scale.

Appendix D: Delegates and Registrants

Virginia Ainslie
President,
Ainslie and Associates
Arlington, VA

Adele N. Ashkar
Associate Dean for Academic Excellence, College of Professional Studies and Director, Landscape Design Program,
George Washington University
Washington, DC

Kate Barba
Division Chief, National Policy and Evaluation Division,
NOAA Ocean and Coastal Resource Management
Silver Spring, MD

Ann Bartuska
Deputy Under Secretary for Research, Education & Economics,
US Department of Agriculture
Washington, DC

Mona Behl
Visiting Fellow, Policy Program,
American Meteorological Society
Washington, DC

Robert Bendick
Director of US Government Relations,
The Nature Conservancy
Arlington, VA

Roxanne Blackwell
Director of Federal Government Affairs,
American Society of Landscape Architects
Washington, DC

David Blockstein
Executive Secretary, Council of Environmental Deans and Directors and Senior Scientist,
National Council for Science and the Environment
Washington, DC

Wilson Bonner
Geoscience Policy Associate,
American Geosciences Institute
Alexandria, VA

Ann Cairns
Director of Strategic Communications and Outreach,
American Geophysical Union
Washington, DC

Tom Chase
Director, Coasts, Oceans, Ports and Rivers Institute
American Society of Civil Engineers
Reston, VA

Carol Collier
Executive Director,
Delaware River Basin Commission
West Trenton, NJ

Margaret Davidson
Director, Coastal Services Center, and Acting Director, Ocean and Coastal Resources Management,
NOAA Ocean and Coastal Restoration
Charleston, SC

Robert D. Day
Executive Director,
Renewable Natural Resources Foundation
Bethesda, MD

Tolessa Deksissa
Program Director, Professional Science Masters in Water Resource Management,
University of the District of Columbia
Washington, DC

Richard Dolesh
Vice President of Conservation and Parks,
National Recreation and Park Association
Ashburn, VA

Richard A. Engberg
Technical Director,
American Water Resources Association
Middleburg, VA

Sarah Gerould
Senior Program Officer,
Ecosystems Mission Area,
U.S. Geological Survey
Reston, VA

Karl Glasener
Director of Science Policy,
American Society of Agronomy,
Crop Science Society of America,
Soil Science Society of America
Washington, DC

Erik Hankin
Public Affairs Coordinator,
American Geophysical Union
Washington, DC

Paul Higgins
Associate Director, Policy Program,
American Meteorological Society
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Matt Hourihan
Director of Research & Development Budget and Policy Program,
American Association for the Advancement of Science
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College Station, TX

Thomas R. Karl
Director, National Climatic Data Center,
National Oceanic and Atmospheric Administration and Chair of the Subcommittee on Global Change Research
Asheville, NC

Kenneth Lanfear
Editor, *Journal of the American Water Resources Association*,
American Water Resources Association
Reston, VA

Ricardo Lopez
Assistant Director, National Vegetation Ecology,
USDA Forest Service
Arlington, VA

Mark Madison
Historian,
U.S. Fish and Wildlife Service
Shepherdstown, WV

G. Tracy Mehan, III
Principal, Drinking Water and Water Quality Group,
The Cadmus Group, Inc. and Former EPA Administrator for Water
Arlington, VA

Melissa Montagna
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Bethesda, MD

Saied Mostaghimi
H.E. and Elizabeth F. Alphin Professor and Associate Dean for Research, Department of Biological Systems Engineering,
Virginia Tech
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Mary Munson
Executive Director,
Coastal States Organization
Washington, DC

Sabine O'Hara
Dean, College of Agriculture, Urban Sustainability and Environmental Sciences and Director, Agricultural Experiment Station & Cooperative Extension Services,
University of the District of Columbia
Washington, DC

Howard N. Rosen
Chemical Engineer,
USDA Forest Service (retired)
Arlington, VA

Christopher Savage
Assistant Director for Water and Aquatic Resources, Watershed, Fish, Wildlife, Air & Rare Plants,
USDA Forest Service
Arlington, VA

Wade Salverson Stewardship/ Biomass Forester,
Bureau of Land Management
Washington, DC

Barbara Tulipane
President and Chief Executive Officer,
National Recreation and Park Association
Ashburn, VA

Amy Unthank
National Fisheries Program Leader, Watershed, Fish, Wildlife, Air and Rare Plants Staff,
USDA Forest Service
Washington, DC

Kasey White
Director for Geoscience Policy,
Geological Society of America
Washington, DC

Billy Williams
Director of Science,
American Geophysical Union
Washington, DC

Appendix E: Congress Program

Congress on Sustaining Natural Resources and Conservation Science: What is at Stake in the Years Ahead

Thursday, December 13, 2013

9:00 am – 9:05 am
Welcome and Opening Remarks

> **Howard N. Rosen**, RNRF Chairman
> Former President, Society of Wood Science and Technology
> Bethesda, MD

9:05 am – 9:10 am
Congress Context and Goals

> **Ann Cairns**, Chair, RNRF Congress Program Committee
> Director, Strategic Communications & Outreach, American Geophysical Union
> Washington, DC

9:10 am – 9:40 am
U.S.'s Historic Leadership Role in Conservation Management and Science
(An overview of America's leadership in conservation, management and science, especially with regard to the federal government's role.)

> **Mark Madison**, Historian, US Fish and Wildlife Service
> Shepherdstown, WV

9:40 am – 10:10 am
Discussion/ Questions

10:25 am – 10:45 am
Overview of Public Support for Natural Resources Management and Protection

Robert Bendick, Director of US Government Relations, The Nature Conservancy
Arlington, VA

10:45 am – 10:55 am
Discussion/ Questions

10:55 am – 11:25 am
Overview of Funding of Conservation Management and Science
(Historic Trends of investments in conservation and science over the past two decades, the current funding situation and prospects, and funding options.)

Matt Hourihan, Director of Research and Development Budget and Policy Program, American Association for the Advancement of Science
Washington, DC

11:25 am – 11:55 am
Discussion/ Questions

12:40 pm – 4:55 pm
What programs and services, ecological assets and services, and environmental infrastructure are most essential? Describe the value of science to sustaining our natural resources. What are the risks-of-loss associated with diminished financial support?

12:40 pm – 1:10 pm
Land Resources

Ann Bartuska, Deputy Under Secretary for Research, Education & Economics, U.S. Department of Agriculture
Washington, DC

1:10 pm – 1:40 pm
Discussion/ Questions

1:40 pm – 2:10 pm
Atmospheric Resources

Thomas Karl, Director, National Climatic Data Center, National Oceanic and Atmospheric Administration
Chair, US Global Change Research Program
Asheville, NC

2:10 pm – 2:40 pm
Discussion/ Questions

2:55 pm – 3:25 pm
Inland Water Resources:
Environmental Management in Economic Hard Times

Tracy Mehan, Principal, Drinking Water and Water Quality Group, The Cadmus Group, Inc. and Former EPA Assistant Administrator for Water
Arlington, VA

3:25 pm – 3:55 pm
Discussion/ Questions

3:55 pm – 4:25 pm
Coastal and Ocean Resources

Margaret Davidson, Acting Director, Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration
Silver Spring, MD

4:35 pm – 4:55 pm
Discussion/ Questions

Friday, December 14

9:00 am – 9:30 am
Research Funding at Universities

David Blockstein, Executive Secretary, Council of Environmental Deans and Directors; and Senior Scientist, National Council for Science and the Environment
Washington, DC

9:30 am – 10:00 am
Discussion/ Questions

10:15 am – 10:45 am
Case study about how the Delaware River Basin Commission has been coping in these financially challenging times.

Carol R. Collier, Executive Director, Delaware River Basin Commission
West Trenton, NJ

10:45 – 11:15 am
Discussion/ Questions

11:15 am – 12:15 am
Congress Wrap Up and Discussion

Robert D. Day, RNRF Executive Director
Bethesda, MD

About RNRF

Purposes

The Renewable Natural Resources Foundation (RNRF) was incorporated in Washington, D.C., in 1972, as a nonprofit, public, tax-exempt, operating foundation. It was established to:

- Advance science and public education in renewable natural resources;
- Promote the application of sound scientific practices in managing and conserving renewable natural resources;
- Foster coordination and cooperation among professional, scientific and educational organizations having leadership responsibilities for natural resources; and
- Develop a Renewable Natural Resources Center.

The foundation represents a unique, united endeavor by outdoor scientists to cooperate in assessing our renewable resources requirements and formulating public policy alternatives.

Membership

RNRF's members are professional, scientific, and educational organizations interested in sustaining the world's renewable natural resources. The foundation is governed by a board of directors comprised of a representative from each member organization. The directors also may elect "public interest members" of the board. Individuals may become Associates for an annual contribution of $50.00 or more.

Programs

RNRF conducts national meetings, congressional forums, public policy round tables and briefings, and international outreach activities. It also conducts an annual awards program to recognize outstanding personal, project, and journalistic achievements. More information about RNRF's programs is available at www.rnrf.org.

Renewable Resources Journal, first published in 1982, promotes communication among RNRF's represented disciplines. The journal is provided to the governing bodies of RNRF member organizations, members of the U.S. Congress and committee staffs with jurisdiction over natural resources, federal agencies, and universities. Tables of contents of all volumes of the journal are available at RNRF's web site.

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