

**FISCAL YEAR 2011 RESEARCH AND
DEVELOPMENT BUDGET PROPOSALS AT THE
ENVIRONMENTAL PROTECTION AGENCY (EPA)
AND THE NATIONAL OCEANIC
AND ATMOSPHERIC ADMINISTRATION (NOAA)**

HEARING
BEFORE THE
**COMMITTEE ON SCIENCE AND
TECHNOLOGY**
HOUSE OF REPRESENTATIVES
ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

MARCH 10, 2010

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FISCAL YEAR 2011 RESEARCH AND DEVELOPMENT BUDGET PROPOSALS AT THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AND THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

WEDNESDAY, MARCH 10, 2010

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 2:23 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

BART GORDON, TENNESSEE
CHAIRMAN

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COMMITTEE ON SCIENCE AND TECHNOLOGY

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Committee on Science and Technology

Hearing on

**Fiscal Year 2011 Research and Development
Budget Proposals at the
Environmental Protection Agency (EPA) and the
National Oceanic and Atmospheric Administration
(NOAA)**

Wednesday, March 10, 2010
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building

Witness List

Panel I

Dr. Paul Anastas
Assistant Administrator
Office of Research and Development (ORD)
U.S. Environmental Protection Agency

Panel II

Dr. Jane Lubchenco
Administrator
National Atmospheric and Oceanic Administration

HEARING CHARTER

**COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES****Fiscal Year 2011 Research and Development
Budget Proposals at the Environmental
Protection Agency (EPA) and the National
Oceanic and Atmospheric Administration (NOAA)**

WEDNESDAY, MARCH 10, 2010
2:00 P.M. TO 4:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

PURPOSE

On Wednesday, March 10, 2010 at 2:00 p.m. the House Committee on Science and Technology will hold a hearing to examine the Administration's Fiscal Year 2011 budget requests for the Environmental Protection Agency's (EPA) Science and Technology (S&T) Programs and the National Oceanic and Atmospheric Administration (NOAA).

WITNESSES*Panel I*

Dr. Paul Anastas, Assistant Administrator, Office of Research and Development (ORD), U.S. Environmental Protection Agency

Panel II

Dr. Jane Lubchenco, Administrator, National Atmospheric and Oceanic Administration

BACKGROUND*Overall FY 2011 Budget Request for EPA*

The President's FY 2011 budget request for the Environmental Protection Agency (EPA) is \$10 billion, a reduction of 2.7 percent compared to the FY 2010 enacted levels. The table below shows the eight primary accounts of the Agency's budget. The Environmental Programs and Management (EPM) account funds the agency's air, water, waste, toxics and pesticides programs. The Superfund account supports clean up of hazardous waste sites. The Superfund account also includes funds for Superfund enforcement to develop and test new methods for clean up and set clean-up standards, and funds for the Inspector General's office to address Superfund issues. The State and Tribal Assistance Grants (STAG) account provides grants to States and local communities to support water and sewage treatment infrastructure construction and improvements. The largest reduction in the Agency's request is in the STAG account.

Table 1: EPA FY 2011 Budget Request (Budget Authority in Millions of dollars)

Account	FY 2010 Enacted Budget	FY 2011 Request	FY 2011 Request vs. FY 2010 Enacted	% Change
Science & Technology¹	846	847	+ 1	+ 0.1%
Environmental Programs & Management	2994	2891	- 103	- 3.4 %
Inspector General	45	46	+ 1	+ 2.2 %
Buildings & Facilities	37	40	+ 3	+ 8.1 %
Oil Spill Response	18	18	0	0 %
Superfund Programs	1270	1258	+ 12	+0.9 %
Insp. General Transfer	10	10	0	0 %
S&T Transfer	27	25	- 2	- 7.4 %
Total SUPERFUND	1307	1293	- 14	- 1.1 %
LUST	113	113	0	0 %
State & Tribal Asst. Grants	4978	4782	- 196	-3.9 %
Rescission	-40	-10	+ 30	-
TOTAL	10,298	10,020	- 278	-2.7 %

¹ Does not include Superfund Transfers.

* Totals do not include the \$7.22 billion from the American Recovery and Reinvestment Act (ARRA) of 2009.

FY 2011 Science & Technology Account: Office of Research and Development

The Administration's budget request for S&T is \$847 million. This includes \$605 million for the Office of Research and Development (ORD), S&T activities conducted by other program offices (e.g. Office of Air, Office of Water), as well as \$25 million requested for S&T activities associated with the Superfund program. In the past, the Superfund S&T funds were drawn primarily from the Superfund trust that was funded by the dedicated Superfund tax. Since the expiration of the tax, this fund no longer exists and all funds must be appropriated from the general treasury.

Approximately 68 percent of S&T funding is for EPA's ORD, which is the primary research arm of the agency. Typically, most of the remaining S&T funds go to the Office of Air and Radiation, and a smaller amount to the Office of Water and to the other program offices.

ORD conducts and sponsors both fundamental research in environmental science and more targeted research to inform EPA's regulatory programs. For example, ORD provides scientific information to support and implement the Clean Water Act. ORD also develops the scientific risk information for the agency's Integrated Risk Information System (IRIS), a database of human health effects of certain chemicals. This program is used by EPA, individual states, and other government agencies to determine hazardous waste site clean up, drinking water, and other health-based standards. ORD develops the scientific underpinning for EPA's air quality standards in areas such as particulate matter and ozone. ORD also investigates the environmental implications of emerging areas such as nanotechnology and endocrine disruptors.

ORD carries out these responsibilities by conducting intramural research at EPA's laboratories, awarding contracts, and supporting fellowships and research at colleges and universities through the Science to Achieve Results (STAR) grant program. The tables below provide breakouts of ORD funds among the various research programs at ORD, as well as further detail on STAR grants and fellowships program.

**Table 2: EPA ORD Budget Changes: Research Programs
2010 Enacted versus Presidents FY 2011 Request (in millions)¹**

Program	FY 2010 Enacted	FY 2011 Request	Change in Millions	% Change
Clean Air (now include Air Toxics Program/Projects and NAAQS)	82	85	+ 3	+ 3.7 %
Drinking Water	49	52	+ 3	+ 6.1 %
Water Quality	62	69	+ 7	+ 11.3 %
Land	36	34	- 2	- 5.6 %
SITE	0	0	0	0 %
Homeland Security	35	31	- 4	- 11.4 %
Human Health Risk Assessment	48	49	+ 1	+ 2.1 %
Computational Toxicology	20	22	+ 2	+ 10.0 %
Endocrine Disruptors	11	17	+ 6	+ 54.5 %
Global Change	21	22	+ 1	+ 4.8 %
Human Health and Ecosystems	160	154	- 6	- 3.8 %
Pesticides and Toxics	27	28	+ 1	+ 3.7 %

¹ Information for Table 2 provided by EPA's Office of Research and Development briefing on February 18, 2010 to the House Science and Technology Committee

HCC Fellowships	11	17	+ 6	+ 54.5 %
Environmental Technology Verification	0	0	0	0 %
Sustainability (now includes Pollution Prevention)	27	25	- 2	- 7.4 %
Congressional Earmarks	4.7	0.0	- 4.7	- 100 %
Total	594	605	+ 11	+ 1.9 %

**Table 3: STAR Grants and Fellowships Program
2010 Enacted versus Presidents FY 2011 Request (in millions)**

STAR Program Research	FY 2010 Enacted	FY 2011 Request	Change	% Change
Computational Toxicology	3	3	0	0 %
Drinking Water	5	7	+2	+40.0 %
Endocrine Disruptors	0	7	+7	+100 %
Global Change	6	7	+1	+16.7 %
Human Health and Ecosystems	23	25	+2	+8.7 %
Clean Air	16	19	+3	+18.8 %
Pesticides and Toxics	1	0	-1	-100 %
Sustainability	0	1	+1	+100 %
Water Quality	0	5	+5	+100 %
STAR Fellowships	8	14	+6	+75.0 %
STAR Grants and Fellowships Program Total	62	88	+26	+42.0 %

Within the context of a decrease in funding for EPA as a whole, the FY 2011 budget proposes increases for a range of intramural and extramural research and development activities.

- \$88 million for the STAR Program, an increase of \$26 million over the FY 2010 enacted levels, to invest in the next generation of environmental scientists and to leverage wider scientific community expertise on key issues.
- \$20 million for research to support the safe development of nanomaterials.
- \$10.3 million, an increase of \$6 million, for green water infrastructure research to address storm water management.
- \$1 million in extramural contracts for Electronic Waste and Electronic Design.
- \$4.4 million to study the impact of hydraulic fracturing technology on ground water quality and implications for public health and the environment.
- \$85 million, an increase of \$3.4 million, for the Next Generation Monitoring Network for ambient air pollutants.
- \$17 million for endocrine disrupting chemicals research and \$22 million for computational toxicology. Both are important for human health and ecological risk assessment. The budget proposals are an increase of \$6 million and \$2 million, respectively.
- As with the FY 2010 budget, the FY 2011 budget again proposes the elimination of the Superfund Innovative Technology Evaluation (SITE) Program and the Environmental Technology Verification (ETV) program. Both programs support the development and testing of innovative environmental technologies for cleanup of hazardous substances. The SITE program was created in the Superfund statute.
- The FY 2011 President's Budget reflects the merging of the Air Toxics and NAAQS programs into a Clean Air program which will focus on multi-pollutant sources and effects rather than sources and effects of individual pollutants.

EPA–Science Advisory Board (SAB) FY 2011 budget analysis

The EPA's Science Advisory Board (SAB) supports the investment in research reflected in the President's budget request. However, the SAB argues that the marginal increases in clean air and global change research will not allow EPA to develop research to support regulatory strategies resulting from the Agency's green-

house gas Endangerment Finding. The SAB is also concerned that the decrease of 14 full-time employees and \$2 million for the Ecological Services Research Program threatens the future of the program and the research needed to understand the causal links between stressors and changes in ecosystem processes. The SAB argues that repeated cuts in funding for ecological research have drastically reduced the agency's ability to monitor and protect the nation's ecosystems. The President's budget request also proposes a near \$1 million decrease for susceptible population and cumulative risk (\$2.5 million) research; some believe this reduction undermines the environmental justice initiatives and announcements made by the Administrator of EPA, Lisa Jackson. The EPA budget request includes little to no proposed investment in the social, behavioral, and decision sciences which many believe are important to continued climate change, ecosystem, and environmental justice research.

OVERALL FY 2011 BUDGET REQUEST FOR NOAA

The President's FY 2011 budget request for the National Oceanic and Atmospheric Administration (NOAA) is \$5.5 billion for discretionary appropriations, a 17 percent increase above the FY 2010 enacted levels, and \$5.7 billion in direct obligations. NOAA's mission includes weather forecasting, climate prediction, and the management of fisheries, coastal and ocean resources. In addition, NOAA is responsible for mapping and charting coastal areas and providing other navigation support services through the National Ocean Service (NOS). NOAA conducts research in support of these missions including atmospheric, coastal, and oceanic sciences, climate and air quality research, ecosystem research, and fisheries and marine mammal research. NOAA also operates a constellation of satellites that monitor and transmit data for weather forecasting, climate prediction, space weather forecasting, and earth and ocean science research through the National Environmental Satellite Data and Information Service (NESDIS).

Table 1 shows the six primary accounts or line offices of the agency's budget. The National Weather Service (NWS), the Office of Oceanic and Atmospheric Research (OAR), the National Environmental Satellite, Data, and Information Service (NESDIS), and Program Support received increases in the FY 2011 request. The Administration's budget proposes to decrease funding for the National Ocean Service (NOS) and the National Marine Fisheries Service (NMFS).

Table 1: NOAA FY 2011 Budget Request (millions of dollars)

Program	FY 2010 Enacted	FY 2011 Request	Change	% Change
National Weather Service	999.8	1,003.2	+ 3.4	+ 0.34%
Oceanic & Atmospheric Research	449.1	464.9	+ 15.8	+ 3.5 %
National Environmental Satellite, Data, and Information Service	1,398.5	2,209.0	+ 810.5	+ 58.0%
Program Support	485.9	515.1	+29.2	+ 6.0 %
National Ocean Service*	578.7	550.6	- 28.1	- 4.9 %
National Marine Fisheries Service**	1,008.2	992.4	- 15.8	- 1.6 %
TOTAL Direct Obligations***	4920.2	5735.2	+ 815.0	+ 16.6%
TOTAL Discretionary Appropriations (Net of Financing & Transfers)	4,748.4	5,554.5	+ 806.1	+ 16.9%

*NOS programs are shared jurisdiction with the Resources Committee or not within the jurisdiction of the Committee on Science and Technology.

**NMFS is solely within the jurisdiction of the Resources Committee.

***This table includes appropriated funds plus transfers from fisheries funds.

National Weather Service (NWS)

NWS provides weather, hydrologic, and climate forecasts and warnings for the United States, adjacent waters, and ocean areas. NWS provides a national infrastructure to gather and process data worldwide from the land, sea, and air.

The request for NWS is a less than one percent net increase of \$3.4 million over the FY 2010 enacted budget. The Administration is requesting a \$10.4 million increase for the NWS Operations, Research and Facilities (ORF) accounts and \$7 mil-

lion decrease for the NWS Procurement, Acquisitions and Construction (PAC) accounts. Although the Administration is requesting an overall marginal increase for NWS, there are a number of reductions for specific line items in the PAC account.

The Administration requested increase in the ORF accounts is within the Local Warning and Forecasts Program for: (1) the completion of the required IT security improvements to the National Critical Space Weather System and Aviation Weather, (2) Next Generation Air Transportation System (NextGen) development activities, and (3) improvement aviation weather services.

The requested increases in the ORF accounts are partially offset by decreases in funding. There are several programs proposed for elimination that are designated by Congress for funding and are routinely eliminated by the Administration as "Congressional earmarks." A number of these programs have been funded for many years and support on-going forecasting services (e.g., Susquehanna River Basin Flood System). A project that was eliminated is the U.S. Weather Research Program's Hemispheric Observing System Research and Predictability Experiment (THORPEX), a multi-year international field experiment to improve two to ten-day forecasts done in cooperation with international partners and numerous U.S.-based research organizations (\$1.5 million).

The President's FY 2011 request proposes to continue support in the following areas: strengthening the U.S. Tsunami Warning Network (\$23 million); completing and sustaining a growing network of NOAA weather radios (\$12.6 million); and operation and maintenance of the Advanced Weather Interactive Processing System (AWIPS) (\$39 million), the Automated Surface Observing System (ASOS) (\$11 million), and the Next Generation Weather Radar (NEXRAD) (\$46 million). AWIPS is specialized software that enables forecasters to prepare accurate, timely weather forecasts and warnings. ASOS is composed of the sensors needed to measure and record significant weather conditions. NEXRAD is the radar system that shows patterns and movement of weather conditions.

There are longstanding concerns that the incremental funding increases that NWS receives may not be sufficient to cover all operational and maintenance requirements for current weather forecasting equipment. This may be especially problematic if the United States experiences a year of severe weather events and frequent or intense hurricanes, resulting in damage or loss to weather monitoring and forecasting equipment.

National Environmental Satellite Data and Information Service (NESDIS)

The President's budget request for the National Environmental Satellite Data and Information Service (NESDIS) is \$810.5 million, a nearly 60 percent increase over the FY 2010 enacted levels. Overall, the Administration request would reduce the NESDIS Operations, Research and Facilities (ORF) account by \$9 million (4.5 percent) relative to the FY 2010 enacted budget, and increase the NESDIS Procurement, Acquisition and Construction (PAC) account by \$819 million (68 percent) over the FY 2010 enacted budget.

NESDIS ORF

The ORF budget for NESDIS is divided into two accounts: Environmental Satellite Observing Systems, and NOAA's Data Centers & Information Services.

The Environmental Satellite Observing System account contains the programmatic funding for management, processing, analyzing, and archiving the data received from all of NOAA's weather monitoring equipment—both ground-based and space-based. The requested increases of \$4.8 million over the FY 2010 appropriation would support the routine replacement and upgrading of ground based equipment and software and to maintain the continuity of data on sea ice used to forecast sea ice changes to support navigation. However, the budget request does not seem to demonstrate an investment in ocean vector wind studies. With the recent demise of the QuikSCAT satellite, the Tropical Prediction Center lost an important data source for its marine wind forecast products. The Center also employed QuikSCAT data in the early stages of predicting hurricane tracks. NOAA has not yet made a decision whether to proceed with the Extended Ocean Vector Wind Mission recommended by the National Research Council's Earth Sciences Decadal Survey.

The Data Centers and Information Services account funds data processing and analyses at the agency's major data centers: the National Climatic Data Center (Asheville, North Carolina); the National Oceanographic Data Center (Suitland, Maryland) and the National Geophysical Data Center (Boulder, Colorado). This account also supports a number of regional climate centers that provide data and information services. The centers must also prepare to support the increase in delivery rates and quantities of information as NOAA's new satellite systems enter oper-

ation. The Administration's budget proposes to reduce this data centers and services account by \$13.7 million below the FY 2010 enacted budget.

NESDIS PAC

The budget for NESDIS is dominated by acquisitions for NOAA's two weather satellite systems: the Polar-Orbiting Environmental Satellites (POES) which orbit the earth and provide information for medium to long-range weather forecasts; and the geostationary satellites (GOES) which gather data above a fixed position on the earth's surface and provide information for short-range warnings and current weather conditions. To maintain the continuity of weather forecasting data as older satellites retire, a new series of satellites are under development for both systems. Increases and decreases in the PAC account reflect the different phases of the satellite acquisition.

There is a proposed increase of \$62.5 million above the FY 2010 enacted budget for the current series of GOES satellites, GOES-R, to support the continued development and procurement of this new series, which is currently scheduled for launch in 2015. The GOES-R satellite series was originally scheduled for launch in 2014. Cost overruns have plagued this program, and in 2006 the GOES-R series was projected to cost \$5 billion more than the original estimate of \$6.2 billion. NOAA consequently restructured the program to achieve cost reductions, and obtained independent cost estimates for the program. The Administration now estimates the cost of the new GOES series at \$7.62 billion through 2028. Cost savings were achieved by reducing the number of satellites in the series (from four to two) as well as removing one of the major sensors, reducing the capabilities of the satellites.

The PAC account also reflects the \$678.6 million requested increase for the Joint Polar Satellite System (JPSS)². The JPSS total request of \$1.1 billion contributes to the nearly 60% increase of the NESDIS line office over the FY 10 enacted level. This increase is a sizable portion of the agency's total \$806 million proposed growth in FY 2011.

Originally, NOAA was part of a tri-agency effort³ to develop the NPOESS satellite program. NPOESS data and products are considered "mission-critical" for both civilian and military weather forecasting and climatology needs; however, the program had major problems throughout. Since 2002, oversight by Congressional committees, Government Accountability Office (GAO) reports, and independent review teams have documented problems with satellite instrumentation, cooperation among the agencies involved, and the program's life-cycle cost; GAO's most recent testimony to the S&T Committee indicated that total cost estimates had grown to \$15 billion and were not yet stabilized.

Due to these serious management issues, schedule slips, and cost over-runs, the Administration's FY 2011 budget contains a major restructuring of NPOESS. This decision will dissolve the integrated program into two separate programs: a military program managed by the Department of Defense; and a civilian program managed by NOAA/NASA. The NOAA/NASA program is now known as JPSS and it will be responsible for satellites flying in the afternoon orbits while DOD satellites will be responsible for the morning orbits. The United States will rely on European satellites for operational weather observations for the remaining orbit. Satellite procurement will be separated for each program; however, both programs will deliver data to a common ground system, and NOAA will continue to operate all satellites while in orbit⁴. The United States has already invested nearly \$6 billion in the overall system, and developed five sensors to date.

In addition to procuring these satellite systems, the Administration is requesting \$49.4 million to restore high priority climate sensors that were de-manifested from the NPOESS program in 2006 as a result of the Nunn-McCurdy mandated restructuring of the program.

NOAA oversees several satellite systems in addition to GOES and POES. The Deep Space Climate Observatory (DSCOVR), formerly known as Triana, has a request of \$9.5 million to initiate refurbishment of the satellite and to develop a Coronal Mass Imager to maintain continuity of solar wind data used for geomagnetic storm warnings. The total life cycle of DSCOVR is projected to be \$85 million.

The JASON satellite series is managed in partnership with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). The JASON-

²The JPSS satellite program was formerly known as the National Polar-Orbiting Operational Environmental Satellite System, NPOESS.

³NOAA, the National Aeronautics and Space Administration (NASA), and the Department of Defense (DoD) collaborated to develop NPOESS. This tri-agency effort was abandoned in February 2010 by OSTP, and NOAA/NASA are moving forward with the "JPSS" program.

⁴NOAA has been operating the Defense Meteorological Satellites for DOD since May 1998.

3 satellite FY 2011 budget request is a \$30 million increase over the FY 2010 enacted level of \$20 million to continue the development of this altimetry satellite that will provide data for ocean climatology and hurricane intensity forecasting.

Oceanic and Atmospheric Research (OAR)

The office of Oceanic and Atmospheric Research (OAR) is the primary research arm of NOAA, representing over half of all NOAA research programs. OAR conducts the scientific research, environmental studies, and technology development necessary to improve NOAA's operations. OAR activities are carried out through seven NOAA laboratories and via extramural research activities at 30 National Sea Grant colleges and universities. The Administration proposes to increase funding for OAR by nearly \$16 million, approximately a four percent increase above the FY 2010 enacted funding levels. The OAR PAC account is flat funded; therefore, all requested increases in the OAR FY 2011 budget are in the ORF account.

- An increase of \$6 million in the Phased Array Radar and Tornado Severe Storm Research.
- An increase of \$5 million in Weather and Air Quality Research.
- An increase of \$29 million in competitive research programs including the National Integrated Drought Information (NIDIS).
- The Administration requests \$11.6 million in funding for the Integrated Ocean Acidification Research program. This work will enhance current knowledge to improve adaptive strategies and management of living marine resources impacted by ocean acidification.

These increases are offset by a few reductions:

- A marginal decrease of \$500,000 from the National Sea Grant Program.
- A decrease of \$3 million from Ocean Exploration and Research. The Administration continues the merger of the National Undersea Research Program (NURP) with the Ocean Exploration Program.
- A \$4 million decrease for the Partnership Programs of Climate Research.
- A \$5.5 million decrease for the Partnership Programs of the Weather & Air Quality Research.

National Ocean Service (NOS)

The National Ocean Service (NOS) protects the National Marine Sanctuaries and advocates coastal and ocean stewardship. The NOS also introduced electronic nautical charts which interface with Global Positioning Systems (GPS) to enhance the safety and efficiency of navigation of U.S. waterways. The President's FY 2011 request would reduce overall funding for NOS programs by \$28 million, or five percent, compared to the FY 2010 enacted budget.

The NOS ORF account is reduced by \$22 million. Navigation Services has a proposed decrease of \$12 million. The Ocean Resources, Conservation and Assessment account has a proposed net reduction as compared to the FY 2010 enacted budget of \$17 million. This includes a \$24 million reduction in the Ocean Assessment Program (OAP), and \$3 million decrease in Response and Restoration. The Ocean Assessment Program includes a decrease in funding for the Integrated Ocean Observing System (IOOS) Regional Observations of \$12 million. The FY 2011 budget request for the Ocean and Coastal Zone Management accounts would receive an increase of \$15 million along with a \$10.5 million increase for the National Centers for Coastal Ocean Science (NCCOS). The NOS-PAC accounts are also reduced by \$6.5 million. This includes a cut in the Marine Sanctuaries Construction (\$8.5 million) and an increase of \$5 million in the acquisition of the Coastal and Estuarine Land Conservation Program.

Program Support

The Program Support line office supports corporate services and agency management. This includes the Under Secretary's office, the office of the Chief Financial Officer, the Program, Planning and Integration Office, and the NOAA Education Program. Overall, the Administration requests an increase in the Program Support account of \$29.2 million (a six percent increase over the FY 10 enacted funding level).

- Most of this increase is due to continued construction of facilities under the PAC accounts (\$24.8 million), in particular the Pacific Regional Center in Honolulu (\$14 million).

- NOAA Education Program FY 2011 budget request is reduced significantly below its FY 2010 funding level of \$53.8 million to a proposed funding level of \$20.8 million for FY 2011.
 - The Competitive Education Grants request was decreased by \$7 million.
 - The Education Partnership and Minority Serving Institutes Program is flat funded.
 - Eleven education programs are proposed to be eliminated, including the JASON education and outreach program.

Chairman GORDON. This hearing will come to order. Good afternoon. I want to welcome everyone to today's hearing on the Administration's Fiscal Year 2011 Budget Request for the Environmental Protection Agency and the National Oceanic and Atmospheric Administration.

When air and water pollution become a threat to our public and economic health, we need strong science and research programs at NOAA and EPA to help us understand the problems and respond.

EPA leads the Nation's environmental science research education and assessment efforts. These investments have been critical to protecting the environment as well as our own health since the 1970s. Four years ago the Agency's research budget sustained a five percent cut. The fiscal year 2011 request proposes to reduce EPA's overall budget, however, we are pleased to see a slight increase in funding for research and development.

We also applaud the Administration for substantial increases in funding in the STAR Grant and Fellowship Program. As this committee prepares to reauthorize the *America COMPETES Act*, it is equally important for our Federal agencies to recognize the value in investing in our future science, scientists, and engineers.

However, the budget request appears to lack funding in certain areas that are key to protecting our environment, both now and in the future. For example, research on global change and ecological services is important to improving the quality of life of every American. I don't see this reflected in EPA's research budget, and I look forward to discussing this with you further this afternoon.

Now, another agency that is essential to improving our understanding of the environment is NOAA. NOAA provides Americans with a daily weather forecast, severe weather warnings, coastal conditions, and climate information. The wintry weather that we have been experiencing in DC and the tsunami warnings that were issued across the Pacific provided clear examples of what NOAA may be famous for, weather and storm forecasts.

NOAA's dedicated scientists use cutting-edge research and tools to provide the public, city planners, emergency managers, and other decision makers with reliable information. NOAA's missions are large and diverse. Sound investments are needed in the agency's workforce, equipment, and research and education programs. For the first time in a long time the budget request for NOAA has been increased. This is a step in the right direction.

That said, most of the increase is allotted for the satellite system, NPOESS, which is now known as JPSS, the Joint Polar Satellite System. For the ones of us that have followed NPOESS for awhile, we think it is probably good to have another name.

This committee certainly understands the importance of mission-critical satellite programs. We depend on satellites for forecasting, observation, and understanding of climate and weather phenomena. However, this budget proposal still lacks the level of funding needed for NOAA to actually fulfill all of its diverse missions.

Likewise, EPA has a great deal of work to do. It is time to move these agencies, their missions, and our country forward by giving them the resources they need to fulfill their responsibilities. In today's hearing we will hear from both agencies on separate panels.

I look forward to discussing the Administration's budget proposal with each of you.

[The prepared statement of Chairman Gordon follows:]

PREPARED STATEMENT OF CHAIRMAN BART GORDON

Good Afternoon. I want to welcome everyone to today's hearing on the Administration's FY 2011 Budget Request for the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA). When air and water pollution become a threat to our public and economic health, we need strong science and research programs at NOAA and EPA to help us understand the problem and respond.

EPA leads the nation's environmental science, research, education and assessment efforts. These investments have been critical to protecting the environment as well as our own health since the 1970s. Four years ago, the agency's research budget sustained a five percent cut. The fiscal year 2011 request proposes to reduce EPA's overall budget. However, we are pleased to see a slight increase in funding for research and development.

We also applaud the Administration for the substantial increase in funding for the STAR Grant and Fellowship Program. As this Committee prepares to reauthorize the *America COMPETES Act*, it is equally important for our Federal agencies to recognize the value in investing in our future scientists and engineers.

However, the budget request appears to lack funding in certain areas that are key to protecting our environment, both now and in the future. For example, research on global change and ecological services is important to improving the quality of life for every American. I don't see this reflected in EPA's research budget. And I look forward to discussing this with you further this afternoon.

Now, another agency that is essential to improving our understanding of the environment is NOAA. NOAA provides Americans with daily weather forecasts, severe weather warnings, coastal conditions, and climate information. The wintery weather that we've been experiencing in DC, and the tsunami warnings that were issued across the Pacific provide clear examples of what NOAA may be most famous for—its weather and storm forecasts.

NOAA's dedicated scientists use cutting-edge research and tools to provide the public, city planners, emergency managers and other decision makers with reliable information. NOAA's missions are large and diverse. Sound investments are needed in the agency's workforce, equipment, and research and education programs.

For the first time in a long time, the budget request for NOAA has been increased. This is a step in the right direction. That said, most of this increase is allotted for the satellite system, NPOESS, which is now known as JPSS, the Joint Polar Satellite System.

This Committee certainly understands the importance of this mission-critical satellite program. We depend on satellites for forecasting, observation, and understanding climate and weather phenomena. However, this budget proposal still lacks the level of funding needed for NOAA to actually fulfill all of its diverse missions. Likewise, EPA has a great deal of work to do. It is time to move these agencies, their missions, and our country forward by giving them the resources they need to fulfill their responsibilities.

In today's hearing we will hear from both agencies on separate panels. I look forward to discussing the Administration's budget proposal with each of you. At this time, I would like to recognize our distinguished Ranking Member, Mr. Hall of Texas for his opening statement.

Chairman GORDON. And with that I would like to thank you for being here, and now I want to yield to my friend from Texas, the Ranking Member, Mr. Hall.

Mr. HALL. Mr. Chairman, thank you, and I think I thank you for holding this hearing. I would like to welcome our witnesses here today one at a time, and I look forward to hearing their testimony. That ought to be all I have to say, but I will go on and redress this since I haven't had a chance to read it until I got here today, but I wrote it.

In the last three weeks we have held budget hearings on NASA, the Office of Science and Technology Policy, and the Department of Energy, and each of these hearings Administration has proposed

radical changes to longstanding science and technology policies with very little detail or clear direction forward and with billions of dollars at stake. We have seen this with NASA and human spaceflight as well as DOE with Yucca Mountain.

The two agencies before us today follow that trend, and I am concerned about several of the proposed changes in their budgets. NOAA has recently made announcements that move the agency in a dramatically new direction. As a final arbiter of this inner-agency project, OSTP announced their decision to dissolve the National Polar Orbiting Operational Environmental Satellite System or NPOESS, thereby severing a 16-year effort between NOAA, NASA, and the Department of Defense to create a single, next-generation system of weather satellites.

And the decision to split the program into two parts with NOAA and NASA responsible for the afternoon orbit and DOD responsible for the morning orbit comes as a bit of a surprise. It is even more surprising that this decision was reflected in NOAA's budget request but was not reflected in DOD's request. DOD has not announced whether it plans to use legacy technology or build a new satellite for this orbit. Their decision comes without a full transition plan, a detailed cost estimate, or an idea of how a joint grant system will impact data coming from potentially two different satellite systems. This committee has been engaged from the beginning on this issue, and it will need to exercise substantial oversight before we can approve of moving forward.

I am also concerned about the recent announcement regarding the creation of a NOAA Climate Service. NOAA's announcement indicated that the Agency would be creating a new line office and reorganizing research by moving labs, data centers, and observing networks into the new office. I am not supportive of this change, and as Ranking Member I believe that this committee should have an opportunity to examine this proposal in detail. I do not think it is appropriate for a change of this magnitude to be decided on solely by the Appropriations Committee through a reprogramming request.

I am also uncomfortable with the idea that this budget requests \$47 million dollars under the Ocean and Atmospheric research budget line when this funding is intended to go into the new line office.

Finally, I am troubled that the EPA has recently made some landmark decisions that could dramatically alter the U.S. economy. The Endangerment Finding, which states that carbon dioxide endangers public health and welfare, that was finalized last December, if allowed to stand could wreck havoc throughout the economy. Last December after the Agency's announcement, when I introduced House Resolution 954, which expresses a sense to the House of Representatives regarding the scientific protocols, data collection, methods, and peer review standards for climate change research which are necessary to preclude future infringements on the public trust.

After the release of the e-mails from the Climate Research Unit at the University of East Anglia and several admissions by IPCC regarding its conclusion, our trust in what the experts have called the, "gold standard," of climate science is severely shaken. The fact

that the Administrator did not conduct her own extensive review of the scientific literature as is required for adjustments to the National Ambient Air Quality Standards raises a red flag.

It makes us wonder and makes us question why such a thorough review was not undertaken, why similar protocols were not followed for a decision of this magnitude. There are many questions we have about this decision, not the least of which is its validity. Decisions made without the appropriate or, for that matter, legally required justification, often result in obvious and not so obvious unintended consequences.

When determining how to spend taxpayer dollars one expects the Administration would provide detailed analysis, information, and transparency.

I look forward to listening to our witnesses and learning the basis for which many of these decisions were made.

Thank you, Mr. Chairman, and I yield back.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Thank you, Mr. Chairman, and thank you for holding this hearing today on the President's 2011 budget requests for the National Oceanic and Atmospheric Administration and the Environmental Protection Agency. I would like to welcome our witnesses here today and I look forward to hearing their testimony.

In the last three weeks, we have held budget hearings on NASA, the Office of Science and Technology Policy (OSTP), and the Department of Energy.

In each of these hearings, the Administration has proposed radical changes to long-standing science and technology policies with very little detail or clear direction forward and with billions of dollars at stake. We have seen this with NASA and human space flight, as well as DOE with Yucca Mountain. The two agencies before us today follow that trend, and I am concerned about several of the proposed changes in their budgets.

NOAA has recently made announcements that move the agency in dramatically new directions. As the final arbiter of this interagency project, OSTP announced their decision to dissolve the National Polar-orbiting Operational Environmental Satellite System, or NPOESS, thereby severing a 16-year effort between NOAA, NASA and the Department of Defense to create a single next-generation system of weather satellites. The decision to split the program into two parts—with NOAA and NASA responsible for the afternoon orbit and DOD responsible for the morning orbit—comes as a bit of a surprise. It is even more surprising that this decision was reflected in NOAA's budget request but was not reflected in DOD's request.

DOD has not announced whether it plans to use legacy technology or build a new satellite for their orbit. This decision comes without a full transition plan, a detailed cost estimate, or an idea of how a joint ground system will impact data coming from potentially two different satellite systems.

This Committee has been engaged from the beginning on this issue, and it will need to exercise substantial oversight before we can approve of moving forward. I am also concerned about the recent announcement regarding the creation of a NOAA Climate Service. NOAA's announcement indicated that the agency would be creating a new line office and reorganizing research by moving labs, data centers and observing networks into this new office. I am not supportive of this change, and as Ranking Member, I believe that this Committee should have an opportunity to examine this proposal in detail. I do not think it is appropriate for a change of this magnitude to be decided on solely by the Appropriations Committee through a re-programming request.

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protocols, data collection methods, and peer review standards for climate change research which are necessary to preclude future infringements of the public trust.

After the release of the emails from the Climate Research Unit at the University of East Anglia, and several admissions by the IPCC regarding its conclusions, our trust in what the experts have called the “gold standard” of climate science is severely shaken. The fact that the Administrator did not conduct her own extensive review of the scientific literature as is required for adjustments to the National Ambient Air Quality Standards raises a red flag. It makes us question why such a thorough review was not undertaken; why similar protocols were not followed for a decision of this magnitude. There are many questions we have about this decision, not the least of which is its validity.

Decisions made without the appropriate or, for that matter, legally required justification, often result in obvious and not so obvious unintended consequences. When determining how to spend taxpayer dollars, one expects the Administration would provide detailed analysis, information, and transparency. I look forward to listening to our witnesses and learning the basis for which many of these decisions were made. Thank you again, Mr. Chairman. I yield back.

Chairman GORDON. Thank you, Mr. Hall. That is exactly the reason we are having this hearing so that you can ask those very legitimate questions.

If there are Members who wish to submit opening statements, your statements will be added to the record at this point.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good morning. Thank you, Mr. Chairman, for holding today’s hearing on the Fiscal Year 2011 (FY 11) research and development budget requests for the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA).

First, the President’s FY 11 budget calls for \$10 billion for the EPA, a \$278 million reduction from Fiscal Year 2010 (FY 10). While the overall EPA budget has decreased, I am pleased to see the administration continues will invest \$605 million in research and development, which will ensure EPA’s regulations are informed by science-based research and reflect up-to-date information. However, the State and Tribal Assistance Grant (STAG), which provides grants to state and local communities to support water and sewage treatment infrastructure construction and improvement, had the largest reduction. STAG grants are critical to the communities in Southern Illinois, and I am concerned this decrease will have an impact on rural access in Illinois and throughout the nation.

In addition, I was pleased to see the Administration’s budget increases funding for the Science to Achieve Results (STAR) grants program. The additional \$26 million will allow EPA to dramatically increase research grants and fellowships for students around the country, ensuring that we continue to develop new ways of protecting public health and the environment. I have seen the impact of STAR grants in Southwestern and Southern Illinois, where students at Southern Illinois University-Edwardsville are currently using a STAR grant to uncover the environmental impact of toxic metals in frogs. I would like to hear from Assistant Administrator Anastas how EPA will utilize this new funding to expand the reach of the STAR grant program.

Second, the President requests \$5.5 billion for NOAA in the FY 11 budget, an \$806 million increase from FY 10. The majority of this expanded funding will be put towards the acquisition of two weather satellite systems, which provide necessary civilian and defense weather observations. My congressional district in Southern Illinois frequently faces extreme weather conditions, including tornados and ice storms that can destroy property, take out electricity for long periods of time, and even take lives. I appreciate the efforts of NOAA and NASA to continually update and improve the technology of these satellite systems to increase warning times for extreme weather events. I have concerns about the additional \$62.5 million investment in the geostationary satellite, GOES-R. This program has been behind schedule and over budget for several years, which the Committee discussed in a hearing last year. I would like to hear from Administrator Lubchenco how NOAA plans to keep GOES-R on schedule and on budget as the 2015 target launch date approaches.

Finally, I am concerned about the marginal increases included in the budget for the National Weather Service (NWS). The 0.34 percent increase in funding from FY

10 may not be sufficient to cover the costs and needs of the NWS in FY 11. In particular, I am concerned about the impact of this funding on NWS' role in the development of Next Generation Air Transportation System (NextGen) because an enhanced weather reporting system through NWS is vital to improving air transportation. I would like to hear from Administrator Lubchenco, how this funding level in FY 11 will impact NWS' role in implementing NextGen.

I welcome Assistant Administrator Anastas and Administrator Lubchenco, and I look forward to their testimony.

Panel I

Now it is my pleasure to introduce our witness on our first panel. Dr. Paul Anastas is the Assistant Administrator of the Office of Research and Development [ORD] at EPA. Before joining ORD, Dr. Anastas was the Director of the Center for Green Chemistry and Green Engineering at Yale University and the Chief of the Industrial Chemistry Branch in EPA's Office of Prevention, Pesticides, and Toxic Substances. So welcome and since you are new on the block, is this the first time you have testified before a committee?

Dr. ANASTAS. Only the first as—

Chairman GORDON. As the new Administrator. Well, we welcome you here, and you pretty well know the rules, I am sure, that your written statement will be made a part of the record. We welcome your oral statement. We normally try to limit that to five minutes, but as the only panelist I think you should take what you need, and then I am sure Mr. Hall will have some good questions for you.

STATEMENTS OF PAUL ANASTAS, ASSISTANT ADMINISTRATOR, OFFICE OF RESEARCH AND DEVELOPMENT (ORD), U.S. ENVIRONMENTAL PROTECTION AGENCY

Dr. ANASTAS. Well, thank you, and good afternoon, Chairman Gordon, Ranking Member Hall, and the distinguished Members of the Committee. My name is Paul Anastas. I am the Assistant Administrator for the Office of Research and Development at the U.S. EPA, and it is a pleasure to be with you to discuss the fiscal year 2011 President's budget for ORD, as it is called.

In my 60 days since being sworn in as Assistant Administrator, I have seen that ORD is a leader in cutting-edge environmental and human health research, providing a scientific basis to EPA's decisions to support our mission and to protect human health and the environment.

We focus our efforts and resources on those areas where we can make the most value in identifying hazards, quantifying exposures, assessing risks, and enhancing environmental risk management decisions that both protect against and mitigate risks.

ORD is unique in the environmental science community because we conduct research across the various disciplines, the spectrum of disciplines necessary to support environmental and human health decision making. ORD conducts mission-critical research that is multi-disciplinary, integrated, and rigorously peer-reviewed. We also synthesize research, conduct assessments, and provide impartial advice to ensure EPA uses science credibly in its decisions.

President Obama has proposed a budget of \$10 billion to the U.S. Environmental Protection Agency in a time of significant economic challenges faced by families across this Nation. The proposed budget aims to increase efficiencies across the Agency while at the same

time allowing us to continue our critically-important work. The proposed budget clearly demonstrates that science is one of the priorities for the Agency. The Office of Research and Development's total budget request is \$605.7 million, an increase of \$11 million over the 2010 enacted budget.

In January, Administrator Jackson laid out her themes to guide our work at the EPA for the coming year and beyond. She expressed to me personally that ORD will play a critical role in addressing these priorities, which include taking action on climate change, improving air quality, ensuring the safety of chemicals, cleaning up our communities, protecting America's waters, expanding the conversation on environmentalism and working for environmental justice, and building strong state and tribal partnerships.

We are proposing \$14 million for fellowships through the Science and Technology to Achieve Results, the STAR Program, an increase of \$6 million over the fiscal year 2010 enacted level. This will enable EPA to award approximately 240 new fellowships and support an ongoing 120 through the STAR Fellows Program. New fellowships will be awarded through nationwide competition in academic areas of top priority including nanotechnology, climate and clean air issues, and green infrastructure.

In this budget we are also proposing \$17.4 million for research on endocrine disrupting chemicals, including a \$7 million increase in STAR grants. These resources will help accelerate the application of the latest state-of-the-art innovations to advance assessment and management of EDCs and other emerging contaminants of concern.

We are also requesting a \$21.9 million budget for computational toxicology research. This includes an increase of \$1.8 million to develop the next-generation tools that will greatly accelerate the evaluation of chemicals and the agency's Endocrine Disruptor Screening Program.

In the area of electronics, our 2011 budget includes a \$1 million investment to lay the groundwork for research efforts on sustainable design methods and management strategies for electronic devices to mitigate human exposure and environmental releases from the recycling and disposal of electronic waste.

Natural gas plays a role in our Nation's energy future. Hydraulic fracturing is one way of accessing this resource. Recently there have been concerns raised and questions asked about whether hydraulic fracturing may impact ground water and surface water.

To address these questions, the President's budget includes \$4.4 million for hydraulic fracturing research, an increase of \$2.5 million. We are proposing to begin the research in fiscal year 2010.

We are also proposing a \$10.3 million budget for green infrastructure research. These resources fund research to advance the design of sustainable solutions to clean water challenges faced by state and municipalities. Consistent with the President's goals of addressing the grand challenges of the 21st century, EPA's Research Program has the potential to spur innovative solutions for America's aging water infrastructure through approaches that could help produce significant long-term cost savings.

I would like to conclude by providing you with my views on the way that we at the Office of Research and Development view our

work. Sustainability is our true north. Innovation is our most powerful tool. All science and technology alone cannot lead us to a sustainable civilization. The path towards sustainability must have scientific and technological innovation as essential elements. This means that our work at EPA must not merely review, assess, and quantify problems. It must inform the design of innovative new products, processes, and systems that incorporate sustainability as a design criterion, such as the important areas of green chemistry and green engineering.

Our work must be catalytic to inform and empower the broader collection of people who seek to protect the environment. Research is a promise that if we engage in the often-difficult scientific endeavor, we can understand the world better and will be better able to make the world a better place.

I look forward to working with the Committee to address the current and emerging environmental issues that will help our agency protect human health and the environment. Thank you for the opportunity to appear before you here today.

[The prepared statement of Dr. Anastas follows:]

PREPARED STATEMENT OF PAUL ANASTAS

Good morning Chairman Gordon, Ranking Member Hall, and other members of the Committee. My name is Paul Anastas. I am the Assistant Administrator for Research and Development (ORD). It is a pleasure to be here with you this morning to discuss EPA's FY 2011 President's Budget the Office of Research and Development.

ORD is a leader in cutting-edge environmental and human health research, providing the scientific underpinnings to EPA's decisions in support of our mission to protect human health and the environment. We focus our efforts and resources on those areas where we can add the most value to identifying hazards, quantifying exposures, assessing risk, and enhancing environmental risk management decisions that both prevent and mitigate risks.

ORD is unique in the environmental science community because we conduct intramural and extramural research across the entire spectrum of disciplines necessary to support environmental and human health decision making. ORD conducts mission critical research that is multi-disciplinary, integrated and rigorously peer-reviewed. We also synthesize research, conduct assessments, and provide impartial advice to ensure EPA uses science credibly in its decisions.

Introduction

President Obama has proposed a budget of \$10 billion for the U.S. Environmental Protection Agency. At a time of significant economic challenges faced by families across the nation, the proposed budget aims to increase efficiencies across the Agency while at the same time allowing us to continue our critically important work.

The proposed budget clearly demonstrates that science is one of the priorities for the Agency. The Office of Research and Development's total budget request is \$605.7 million, an increase of \$11 million over the 2010 enacted.

In January, Administrator Jackson laid out her themes to guide our work for the coming year and beyond. She expressed to me personally that ORD will play a critical role in addressing these priorities. These themes provide a framework to guide our research efforts and help the Agency achieve measurable results to protect human health and the environment. Important ways the EPA's research and development effort supports these themes include:

Taking Action on Climate Change—ORD research on the impacts of climate change on health and the environment has been used as the scientific foundation for Agency decisions. Our future efforts will provide the scientific roadmap EPA needs to reduce greenhouse gases and help our nation adapt to the effects of climate change.

Improving Air Quality—ORD provides timely scientific information that supports Agency decisions to reduce harmful air pollution. Our future research efforts to better understand and prevent the effects of air pollution will ensure that our nation's communities have healthier air to breathe.

Assuring the Safety of Chemicals—Our work in chemical assessment provides the foundation for our regulatory actions that improve the management of chemicals. Our fundamental research in this area in the coming year and beyond will transform not only the pace, but also the depth of our analysis.

Cleaning Up Our Communities—Our science informs Agency decisions on effective ways to clean up communities all across our nation. This research, and the expert scientific consultation that ORD scientists and engineers offer, will provide critical tools and information needed by the Agency to meet the environmental challenges posed by contaminants in local communities. Additionally, our research on human exposure and exposure metrics will help schools and communities design risk mitigation strategies.

Protecting America's Waters—ORD researchers develop both analytical methods needed to evaluate chemical and microbial contaminants in water distribution systems and approaches for managing watersheds and controlling sources of water quality impairment. Our future water research will advance methods and practices to promote the safety and sustainability of the nation's water resources.

2011 Budget Highlights

Strengthening Science, Technology, Engineering and Mathematics (STEM) Education

We are proposing \$14 million for fellowships through the Science to Achieve Results (STAR) program, an increase of \$6 million over the FY 2010 enacted level. This will enable EPA to award approximately 240 new STAR fellowships and support an estimated 120 continuing STAR fellows. New fellowships will be awarded through nationwide competition in academic areas that are top priorities for EPA including nanotechnology, climate and clean air issues, and green infrastructure.

Assuring the Safety of Chemicals

We are proposing \$17.4 million for research on endocrine disrupting chemicals (EDC), including an increase of \$7 million in STAR Grants. These resources will help to accelerate the application of the latest state of the art innovations to advance the assessment and management of EDCs and other emerging contaminants of concern.

We are proposing \$21.9 million for computational toxicology research. This includes an increase of \$1.8 million to develop the next-generation tools that will greatly accelerate the evaluation of chemicals in the Agency's Endocrine Disruptor Screening Program (EDSP).

E-Waste

Our 2011 budget includes \$1 million to lay the groundwork for research effort on sustainable design methods and management strategies for electronic devices to mitigate human exposure and environmental releases from the recycling and disposal of electronic waste.

Protecting America's Waters

Natural gas plays a role in our nation's energy future. Hydraulic fracturing is one way of accessing that resource. This process involves drilling a well, dewatering the formation, and then injecting fluids under high-pressure to fracture the rock so gas can be extracted. Recently, concern has been growing that hydraulic fracturing may impact ground water and surface water quality which may threaten human health and the environment. To address those concerns, the president's Budget includes \$4.4 million for hydraulic fracturing research, an increase of \$2.5 million. We are proposing to begin the research in FY 2010.

We are proposing \$10.3 million for green infrastructure research, including an increase of \$5 million in STAR Grants. These resources will fund green chemistry and green engineering approaches to advance the design of sustainable solutions to clean water challenges faced by EPA's Office of Water, states, and municipalities. Consistent with the President's goals of addressing the "grand challenges" of the 21st century, this EPA research program has the potential to spur innovative solutions to America's aging water infrastructure challenges through approaches that could have significant long term cost savings.

Conclusion

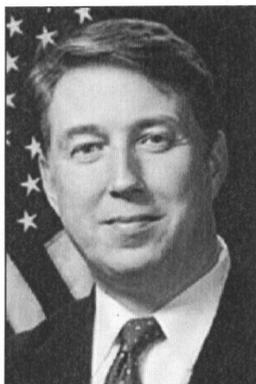
I would like to conclude by providing you with my views on the way we at EPA's Office of Research and Development approach our work. Sustainability is our true north. The work that we do—the research, the assessments, the policy develop-

ment—is part of ensuring that we have a sustainable society; a sustainable civilization. While science and technology alone cannot lead us to a sustainable civilization, the path toward sustainability must have scientific and technological innovation as essential elements.

This means that our work at EPA must not merely review, assess, and quantify problems; it must inform the design of innovative new products, processes, and systems that incorporate sustainability as a design criterion. The traditional, piece-by-piece approach to research has enabled a tremendously deep understanding of our world. We will complement this approach with an integrative systems approach. Our work must be catalytic to inform and empower the broader collection of people who seek to protect the environment. Research is a promise that if we engage in the often difficult scientific endeavor, we can understand the world better and be able to make the world a better place.

I look forward to working with the Committee to address current and emerging environmental problems that will help our Agency protect the environment and human health. Thank you for the opportunity to appear before you today.

BIOGRAPHY FOR PAUL ANASTAS



Paul Anastas, Ph.D. is the Assistant Administrator for EPA's Office of Research and Development (ORD) and the Science Advisor to the Agency. Known widely as the "Father of Green Chemistry" for his groundbreaking research on the design, manufacture, and use of minimally-toxic, environmentally-friendly chemicals, Dr. Anastas has an extensive record of leadership in government, academia, and the private sector.

At the time he was nominated by President Obama to lead ORD, Dr. Anastas was the Director of the Center for Green Chemistry and Green Engineering, and the inaugural Teresa and H. John Heinz III Professor in the Practice of Chemistry for the Environment at Yale University's School of Forestry and Environmental Studies. Prior to joining the Yale faculty, Dr. Anastas was the founding Director of the Green Chemistry Institute, headquartered at the American Chemical Society in Washington, DC. From 1999 to 2004 he worked at the White House Office of Science and Technology Policy, concluding his service there as the assistant director for the environment. Dr. Anastas began his career as a staff chemist at EPA, where he rose to the positions of chief of the Industrial Chemistry Branch, and director of the U.S. Green Chemistry Program. It was during his work at EPA that Dr. Anastas coined the term "green chemistry."

Trained as a synthetic organic chemist, Dr. Anastas' research interests have focused on the design of safer chemicals, bio-based polymers, and new methodologies of chemical synthesis that are more efficient and less hazardous to the environment. A leading writer on the subjects of sustainability, green chemistry, and green engineering, he has published ten books, including "Benign by Design," "Designing Safer Polymers," "Green Engineering" and his seminal work with co-author John Warner, "Green Chemistry: Theory and Practice."

Dr. Anastas has been recognized for his pioneering work with a host of awards and accolades including the Vice President's Hammer Award, the Joseph Seifter Award for Scientific Excellence, the Nolan Sommer Award for Distinguished Con-

tributions to Chemistry, the Greek Chemical Society Award for Contributions to Chemistry, the Inaugural Canadian Green Chemistry Award, a Scientific American 50 Award for Policy Innovation, the John Jeyes Award from the Royal Society of Chemistry, and an Annual Leadership in Science Award from the Council of Scientific Society Presidents. He was a Special Professor at the University of Nottingham and an Honorary Professor at Queens University in Belfast where he was also awarded an Honorary Doctorate.

Dr. Anastas earned his B.S. from the University of Massachusetts at Boston and his M.A. and Ph.D. in chemistry from Brandeis University.

DISCUSSION

Chairman GORDON. Thank you, Dr. Anastas. At this point we will begin our first round of questions. The Chair recognizes himself for five minutes.

ELECTRONIC WASTE

Last year this committee and the House on a large bipartisan basis passed the Electronic Waste Research and Development Act, which dealt with e-waste. I noticed that you have put \$1 million into the budget for e-waste and e-design. Can you tell me about how you intend to—or what you hope to get for that \$1 million, how much of it is going to be internal research versus external, and is this a foundation for a more robust program in the future?

Dr. ANASTAS. Yes. We are looking at this important program and this initial investment as laying the groundwork for what we expect to be a more robust program. We look at—in this coming year for how to scope out where the possibilities are for looking at not only the ways of handling the waste, but also the ways of informing design so that that waste doesn't continue into the future.

As we all know, some numbers are as high as 300 million of used desktop and laptop computers sitting in closets waiting to be disposed of. This is a large legacy problem. We want to make sure that we do not continue with this legacy issue by engaging appropriate designs moving forward.

Chairman GORDON. Will you be looking at alternatives to some of the different elements?

Dr. ANASTAS. Absolutely. Yes. As a chemist one of the ways I approach most of the issues that I face is at the molecular level. When we recognize that every cell phone has about two-thirds of the periodic table in that one phone, we recognize that there are things to consider and perhaps new designs and new materials that can be used.

Chairman GORDON. Well, I think this is an excellent area of interest, and I think that it can—if we can get alternative materials, then it is going to save a lot of bad material going into our landfills as we have better design. I think if—on the front end if we can design them to recycle on the back end, once again, we are going to be saving a lot of money and the landfills. I think this is a very cost-effective program, and I am glad to see that it is in your budget.

Now, I yield to Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman.

EPA'S ENDANGERMENT FINDING

EPA relied heavily on the findings of the IPCC in making its endangerment determination. I guess I will ask a question, and I won't ask you to answer it yet until I enlarge on the question a little bit.

First is, has there ever been another instance in the history of the EPA where the agency essentially justified the decision where scientific underpinning was based on the judgment of other bodies that are not subject to the U.S. Federal policies on scientific research? You may answer that yes or no if you want to.

Dr. ANASTAS. I would say that the bodies that were consulted with were broad, ranging from the National Academies all the way through the U.S. Global Change Research Program, and so I think that the science that was relied upon was from a wide range of sources.

Mr. HALL. I take that as a no. Not really. Do you want to—have you finished answering the question? If not, I will go further.

Well, the combined effects of leaked e-mails from the Climate Research Unit at the University of East Anglia, the several admissions in the last few months from the IPCC of the mistakes in the 2007 Fourth Assessment Report and a continuing insistence by several Administration officials that the underlying science has not been compromised despite all the evidence has severely undermined public trust in the IPCC process. Yet, the IPCC findings are the cornerstone of the agency's endangerment findings.

Given all these issues since finalizing the endangerment findings, do you think it would be appropriate for the agency to go back and review the scientific basis for its finding? And do you intend to do that?

Dr. ANASTAS. One of the things that I think is most important is to recognize that the science for any decision, certainly a decision as consequential as this, has to be solid and reliable, and I do believe that the overwhelming science that this finding is relying on is solid and reliable.

Now, let me be clear. Any time, whether in this case or others, any time there are questions of scientific integrity and questionable science, that needs to be treated accordingly as the scientific community always does. That is in this case, that is in any issue that the EPA deals with.

What doesn't change is that we are seeing a body of knowledge across many sources, across, as I said, the National Academies, the 13 U.S. departments that make up the U.S. Global Change Research Program, a wide body of knowledge.

I have seen nothing in these individual questions that changes my perspective that the overwhelming science supports the endangerment finding.

Mr. HALL. Well, let me ask you this. I will repeat part of my question. Given all these issues since finalizing the endangerment finding, do you think it would be appropriate for the agency to go back and review the scientific basis for its findings, or are you just going to rely on your finding, and the heck with anything else? Is that your attitude?

Dr. ANASTAS. If I believed that there were any—

Mr. HALL. I don't care what you believe. I am interested in what you have researched.

Dr. ANASTAS. What I have researched—

Mr. HALL. I know what you believe because I know who you work for.

Dr. ANASTAS. I see. What I have researched is that great body of knowledge upon which the endangerment finding was based is solid and not in question. There aren't questions being asked about the great, overwhelming, vast scientific contributions that make up that finding.

Mr. HALL. So when I ask that question, I don't think I have an answer. My next would be how does EPA justify moving forward on the questionable foundation when the magnitude of the endangerment findings will impact every sector of the Nation's economy? Is your answer that you don't think it is questionable?

Dr. ANASTAS. The answers that—even the—with this less-than-handful of questions that have been asked about the studies that have been put forward, by comparison to the overwhelming body of knowledge, I do not think that as a whole the scientific basis is questionable.

Mr. HALL. Okay. I am doing my best to be fair with you, so you are going to go back and review it, or are you telling me you are not going to review it?

Dr. ANASTAS. I am saying that if there is any reason to believe that the findings are based on a body of knowledge that is questionable, then that would warrant a review. I have not seen anything that would cause me to question the vast body of knowledge.

Mr. HALL. If you have not seen anything, then did you not talk to your own scientists within the EPA and don't some of them question the science?

Dr. ANASTAS. I ensure that there is a wide body of perspectives when we are looking at the science. Scientists will always draw the conclusions that the data tells them, and so I am—I, like you, sir, am not interested in what people believe. Scientists believe what the data tells them.

Mr. HALL. I guess I am glad my time is up.

Chairman GORDON. Dr. Baird is recognized.

Mr. BAIRD. Mr. Hall may not be the only one that is glad his time is up.

I thank the gentleman, Chairman.

RESEARCH ON SOCIAL BEHAVIORAL SCIENCES

EPA's Science Advisory Board has argued that ORD needs to conduct intramural research and social behavioral and decision sciences as part of its activities. Describe to us how the budget accommodates that or how your research strategy accommodates the social behavioral sciences.

Dr. ANASTAS. One of the things that we recently have not only been discussing but moving toward is, rather than creating isolated disciplinary programs, for instance, around social or behavioral sciences, it is about how we do integrated trans-disciplinary research. So while it would be possible to create a discrete area of social and behavioral sciences, I do believe that it is perhaps more

effective to integrate social and behavioral sciences throughout the research as a thread that goes throughout everything we do.

Mr. BAIRD. I actually agree with that. How will you do it?

Dr. ANASTAS. So one of the steps that we are taking in real time is as we consider the “how” of what we do, it is not separate from the “what” topics we take on, but how we conduct this research is to, from the very beginning of what we are going to tackle, make sure that the wide range of disciplines are there at the table, from problem definition to study design, all the way through the conduct of research.

THE SCIENCE OF OCEAN ACIDIFICATION

Mr. BAIRD. That is good news. I want to—on the climate change issue, I want to talk not just about the temperature issue but your understanding of ocean acidification and the chemistry behind that, because to the best of my knowledge nobody credible has questioned the issue that CO₂ goes into the air, gets dissolved in the water, forms carbonic acid, the acid eats away at the minerals that make up the shelled organism, shells, everything from terapods up to oysters and others.

Is it your understanding that that is a pretty settled science and that you could demonstrate this on a lab bench? In other words, you don't need sophisticated computer models, tree rings or measurements? We could actually bring in—if I am correct or if I am incorrect, correct me, but we could bring in some water, put CO₂—some ocean water, put CO₂ above it, measure what happens to the acidity. Right?

Dr. ANASTAS. Uh-huh.

Mr. BAIRD. And what would happen to the acidity?

Dr. ANASTAS. What we have seen and what is easily obeying the laws of chemistry is that you will see that type of acidity as you increase the atmospheric CO₂ and the concentrations of CO₂, as you mentioned, as carbonic acid. I do want to say that there is reasonable research about what are the feedback loops, what is the role of buffering solutions, and so there is generally—genuinely useful research that can be conducted on that, but certainly as a first approximation your description of the issue is correct.

Mr. BAIRD. And there are some types of plankton that paradoxically seem to actually thrive in higher CO₂ levels. We are not sure why that is.

Dr. ANASTAS. That is right.

Mr. BAIRD. But there are at least research efforts I am familiar with out of Israel and Jordan that take different types of coral species, raise them in different levels of acidified water, actually, the water is coming right off the beach, and then they adjust the CO₂ levels and the acidity. And the corals that are being raised in the more acidic water actually fail to thrive and in some cases their shell actually dissolves. Is that—

Dr. ANASTAS. That is correct, and there are situations where there are organisms known as extremophiles that will thrive in high salt content, high acid content, even higher temperatures. Those extremophiles are exceptional, but they are notable outliers.

Mr. BAIRD. Now, one of the issues as well, organisms can adapt. My understanding is that the pace of change, the pace of acidifica-

tion, the pace of temperature increase is so much more rapid than the normal geological time pace. Is that accurate?

Dr. ANASTAS. That is a concern, that while adaptation is a natural part of evolution, it is the pace of change, the rate of change that is of highest concern because even if we are looking toward things like migration to different areas when you are talking about oceanic acidification, that is—that may not be an option. So the physical adaptation would be a challenge.

Mr. BAIRD. I thank the gentleman, thank the Chair, and yield back my time.

Chairman GORDON. Thank you, and Dr. Broun is recognized.

Mr. ROHRABACHER. Mr. Chairman, I think I was here—

Chairman GORDON. Oh, I am sorry. Excuse me. I understand that you were trumped by seniority, and so Mr.—I am sure Dr. Broun is accommodating and would let Mr. Rohrabacher go forward.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman. I have another hearing to run off to. That is why I needed to get this time in.

CRITICISM AND SUPPORT FOR THE SCIENCE OF CLIMATE CHANGE

I am afraid, sir, that you did not answer the Ranking Member's question, so let me pose it to you again. Could you please, and more specifically, perhaps you could name another major ruling that the EPA has made that was not based on actual research done by the EPA but relying instead on other, perhaps even foreign sources and foreign laboratories to do the research?

Dr. ANASTAS. With all due respect, I have to—I am not sure that I can accept the premise of the question because I don't see that the endangerment finding was based solely on international bodies. One, there is—

Mr. ROHRABACHER. Is it based on your research, EPA-direct research?

Dr. ANASTAS. Was it based on EPA-directed research? EPA research and certainly EPA science played a role, but like virtually everything that the—

Mr. ROHRABACHER. So the answer is you cannot name another one because it didn't exist because the EPA in the past has done direct research, and when it does findings, it is based on research that at least is verified inside your body.

What—maybe you can tell us—

Dr. ANASTAS. Well, sir—

Mr. ROHRABACHER. —the finding that your—the research the EPA had done that verified, for example, that there was no medieval warming period that was based—that was in the IPCC report.

Dr. ANASTAS. So I guess a couple of things. Any time the EPA takes on a major question or a major finding it is not going to rely solely on the research done inside of its labs. It is going to also rely on the research that is done by the broad scientific community.

Mr. ROHRABACHER. In this case you have suggested that the research you relied upon is something that is not questionable. Maybe you could tell me why is it not questionable that that research is not valid when the Russian Academy of Sciences charges

that the computer models, that in establishing the computer models, that information that they gave, they provided was cherry-picked in order to come out with a pre-determined outcome. Does that mean—is that questionable science to you?

Dr. ANASTAS. When we are looking at the findings of National Academies of Science from a dozen different countries coming to the same conclusion, when we are looking across the—

Mr. ROHRABACHER. Sir, I was told as far as—pardon me. I only got five minutes. I am going to have to—we were told that the Academy of Sciences in Russia agreed with this. I went to see the head of the Academy of Sciences in Russia, and he doesn't agree with it. We have had lots of people who even told like this very off-handedly that so many people agree with that, the case is closed, and now we find out that the case isn't closed, that there are heads of major science departments at major universities throughout the world who are calling into question something more specific in this.

The—does it not ring some alarm bells for you that the information that was put into the database to produce this, you know, the computer models, that it is no longer available and that we have been told that that, that we can't review that now? Doesn't that ring an alarm bell with you that you don't have the information to go over?

Dr. ANASTAS. I can tell you that the scientific integrity of any study, whether it be this one or any, is something that is of highest importance. We always want to make sure that things are peer-reviewed at the highest level, and so any time scientific integrity is—

Mr. ROHRABACHER. Has the EPA accepted the argument that they have to take on faith and that you have just accepted that the right information was put into those computers and that that data is no longer available for you to look at? You just accepted that? You call that to be responsible?

Dr. ANASTAS. Faith may have a place in my life, but it doesn't have a place in my science. When I am talking about scientific review, any scientific review should be peer-reviewed, scientists looking at the methods—

Mr. ROHRABACHER. Does it bother you then that when we see that the e-mails between these people which were purloined but now have exposed, the fact that they were going out of their way in order to suppress peer review of their science? Does that bother you?

Dr. ANASTAS. Any individual claim, any individual claim of lack of scientific integrity, of course, is an affront to science—

Mr. ROHRABACHER. Have you looked into that then to see that if that had an impact on the overall findings?

Dr. ANASTAS. The overall findings are based on a wide range of science. The vast majority of the science is not in question.

Mr. ROHRABACHER. I would suggest that a wide range of science, yes, but—and also in ignoring specifics which would undermine the validity of that overall science.

Thank you very much, Mr. Chairman.

Chairman GORDON. Thank you, Dr. Rohrabacher, and now Dr. Broun.

Mr. BROUN. Thank you, Mr. Chairman. Doctor, I have to hand it to you. You really have very strongly endorsed something that is not scientific, and there is no scientific consensus to anthropogenic human—global warming, and you are proselytizing this idea that is being propagated by the radical environmentalists, and you and this Administration are just drinking the Kool-Aid and going down a road that is going to destroy our economy.

Now, the press before us last summer revealed that important comments from career EPA analysts on the agency's greenhouse gas endangerment finding was suppressed by a senior agency official. These press reports include e-mails that indicated that the director of the EPA's National Center for Environmental Economics refused to include the comments, not because of lack of scientific merit, but according to the official because, "The Administration decided to move forward on endangerment," and the "comments did not help the legal or policy case for this decision."

That is not scientific integrity, Doctor, and seeking to have his report included in the proceeding, the analyst wrote, "They are significant because they present information critical to the justification or lack thereof for the proposed endangerment finding. They are valid because they explain much of the observational data that have been collected while—which cannot be explained by the models, the IPCC models."

After muzzling the report the director stated, "With the endangerment finding nearly final, you need to move onto other issues and subjects. I don't want to spend any additional EPA time on climate change. No papers, no research, et cetera."

I find it hard to reconcile these actions with the President's direction or the EPA Administrator's own words, which he promised, "Political appointees will not compromise the integrity of EPA's technical experts to advance particular regulatory outcomes."

And, "EPA's addressing of scientific decisions should reflect the expert judgment of the agency's career scientists and independent advisors."

As Assistant Administrator for EPA's Office of Research and Development, what is your reaction to the following statement that I just read? "With the endangerment finding near final, you need to move on to other issues and subjects. I don't want you to spend any additional EPA time on climate change. No papers, no research, et cetera."

Dr. ANASTAS. I guess you understand that since I have been at the agency for just over a couple of months that preceded my time there, so I can't say that I have personal knowledge of that—

Mr. BROUN. Well, excuse me—

Dr. ANASTAS. —situation, but I—

Mr. BROUN. —for interrupting you. I think you have already answered it because—

Dr. ANASTAS. But—

Mr. BROUN. —what Mr. Hall told you, what Mr. Rohrabacher or what Mr. Hall and Mr. Rohrabacher asked you, you—I think you actually answered my question there.

Dr. ANASTAS. I—

Mr. BROUN. You said no more investigation. You have told us that the science is convincing. It is not convincing. There are thou-

sands of scientists around the world that say that human-caused global warming is not factual, and in scientific integrity, Doctor, just for the name of scientific integrity, please look at other data besides what you have decided on. You said your belief structure doesn't drive science, but actually your belief structure in that there is human-induced global warming is determining your scientific basis and is going to determine the policy that you and EPA are going to carry out.

I find it appalling as a scientist. I find it totally disingenuous, and it is not scientific integrity.

Let me go to my next question. NCEE's direct exclusion of the staff's report on the grounds that it did not advance the, "policy case for the endangerment finding," consistent with the President's guide that, "facts drive scientific decisions, not the other way around."

Dr. ANASTAS. Facts do drive scientific decisions.

Mr. BROUN. They don't drive yours because what you just told Mr. Hall, that is what you have told Mr. Rohrabacher, that is what you are telling this committee, and I—

Dr. ANASTAS. If I may make it clear, there is—

Mr. BROUN. Quickly.

Dr. ANASTAS. —no orthodoxy in science. The only orthodoxy in science is the scientific method.

Mr. BROUN. Well, I am familiar with the scientific method, because I am a scientist as a physician. Some people would disagree with that, but I am an applied scientist, and I know the scientific method. Just arbitrarily accepting something when there are a lot of other data that are totally counter doesn't mean that something is convincing, overwhelming evidence, and that is exactly what you said today. That is exactly what we have had, testimony time after time again. It is just totally disingenuous scientifically for you to be testifying the way you are this morning.

I yield back, Mr. Chairman.

Chairman GORDON. Thank you, Dr. Broun, and Dr. Ehlers is recognized.

THE SCIENTIFIC METHOD AND SCIENTIFIC INTEGRITY

Mr. EHLERS. Thank you, Mr. Chairman, and I start by asking forbearance if I go a little longer. As you know, am—I believe I am the only true scientist on this panel. No, no. You didn't let me finish. On this side of the panel. Okay, and I define scientist as someone who regularly does experiments, writes articles, tests, and has many others review and test them.

Mr. BAIRD. Would the gentleman yield for one moment?

Mr. EHLERS. Yes.

Mr. BAIRD. For the record that applies to myself. I have published in international science journals—

Mr. EHLERS. No. I know.

Mr. BAIRD. —I want to be clear about that. Mr. Broun is making—

Mr. EHLERS. No. I already stipulated to that. But I have maintained my silence in spite of hearing many comments, but I think it is time for me to speak up, and I am sorry, Mr. Rohrabacher left,

but I hope the Chair will be generous with his time because I have kept my mouth shut on many occasions.

The scientific method is, unless you used it consistently and thoroughly, is not always well understood by people. It is also not—many people think it is just so absolute, you know, you do the experiment, you discover something, and you write it, and that is it. Science is a continually-growing subject. I took a course from Edward Teller at one time at Berkeley, it did not affect my politics by the way, but he is a brilliant man, and he commented during one of his lectures, there are four stages to a scientific theory.

The first stage is absurd. It contradicts all previous ideas, previous theories. A good example of that is when Einstein developed the theory of relativity. A lot of people ridiculed him, a lot of them didn't believe it, just said it is simply not true. It can't be. It can't be true. How can mass change as you move? How can light be the same speed no matter what the source of the light is moving, et cetera. So often the first response is absurdity.

Then the second is, of course, more experimentation, more discussion, more talking, and you reach the second stage, which is, well, maybe there is something here, and then the third stage is—it becomes widely accepted. Some people say it is true. A good scientist would never say it is true because you are always finding new knowledge, you are always expanding. But at any rate, it is generally accepted.

The fourth stage that Dr. Teller said is when it is shown to be either wrong or superceded. This is part of the continual growth process of science. Then it is scientific knowledge.

Now, the—I think the only reason there is so much controversy about this particular topic is because of the economic consequences, which has gotten a lot of people excited about it. It is also important to remember that every scientist has his or her own specialty, and I happen to be a physicist, and I happen to think physics is the most precise science, perhaps because the research I did was accurate to parts per billion, and in fact, using the same principles that set the time standard to the world, which sets time to one second out of two billion years.

Every science has its liabilities and mistakes, but it is a continual growth process. Now, I have heard so much about it has been proved that the IPCC is wrong, or it has been proved that such and such is not true, or that the stolen e-mails from various universities show that they were trying to deceive people. They show no such thing. That sort of discourse is common in science. Lots of argumentation, particularly in the first stage of absurd and going to maybe there is something there. A lot of disagreements.

Now, as I said, physics has fewer of them because it is more precise. Astrophysics has a lot more disagreements. Many of the biological issues have very, very many disagreements. But the point is science just keeps going on, keeps doing more experience, keeps acquiring more evidence, and out of that eventually an agreement emerges.

Now, I have heard this said in this committee many times. There are thousands of scientists who disagree with the ideas about global warming. I tend never to get in that argument. That is not my field. If I am going to make public statements about the results and

the accuracy, I am going to study them very thoroughly. I am going to get involved in that science.

But I reviewed a good part of the list of the scientists who say it is wrong. Most of them are not in any field related to the subject at hand. Many of them are little known or not just to me but to others I have asked about it, and these are not experts in the field. When you go out and answer, you go to the experts in the field, ask them the right questions, and of course, you have to understand the subject, and ask them to go do an experiment to prove this or that is wrong. It is not a matter of relying on the Russian Academy of Sciences. It is a matter of what does the experiment say, and how good is the experimenter.

Normally, the integrity of a scientist is not questioned because by and large over the years anyone who doesn't have integrity in science is not going to be in the field very long because someone else is going to come along and disprove it, and boom, they are out of a job in seconds. But there are mistakes made. There is a lack of understanding, and the need is then for more experimentation to find out just what is going on.

Today everyone believes Einstein's theory of relativity, but yet it doesn't quite cover every area. There is still open questions there. When Newton advocated his theory of planetary motion, it went through that stage. The first stage was absurd. That can't be true. Second, people believed it. For centuries we used it. We used it to send astronauts to the moon and to get them back. That was largely Newtonian physics.

But Einstein shows that Newtonian physics is not wrong, but it has been superceded. It applies in its realm of domain, which is slowly moving objects in our normal universe. But if you want to understand astrophysics, the motion of stars, the life of stars, you have to understand Einstein's theory of relativity because Newtonian physics doesn't apply there. Those are very rapidly-moving objects, a totally different world than we live in, we can't imagine it.

But you probably heard that in elementary physics in high school you learn that no two objects can occupy the same space at the same time. That is blatantly false. They can if they are very tiny, atomic-size particles. Each of us is made of atomic and nuclear particles. We have particles in our—inside our body, electrons, atoms that occupy the same space at the same time. How can that be? That is not commonsense. But, in fact, it is true. Chrono-mechanics tells you it is true, and it fits the theory perfectly.

So my point is simply we—I have heard a lot of debate in this chamber about this topic and much of it besides the point. The point is if you are trying to disprove the climate change issues or any of that thing, let us get the people together who can answer the question. Let us fund the research that is necessary. If you don't believe someone can be honest about it, you hire a different scientists who wants to keep his job and therefore, will not lie. There are lots of ways to solve this.

But I really think the economic factor is what has generated so much opposition that has led to a lot of people saying things that are simply not true or not correct in the scientific sense.

So sorry to unload all that at once, Mr. Chairman, but I thought I was entitled to it at one point.

Chairman GORDON. Thank you, Doctor. I am glad to know the four steps of Scientists Anonymous now.

Mr. EHLERS. Right. And also they work in politics, too.

Chairman GORDON. Thank you. That was very informative.

Mr. Hall, do you have any further questions?

Mr. HALL. Just briefly.

The professor talked about Dr. Tellers and electrons and experts in the field. How about experts in the EPA? You have some, and you do have scientists within the EPA who question this science. Have you spent time with them?

Dr. ANASTAS. Let me be clear.

Mr. HALL. And tell me their names if you have.

Dr. ANASTAS. Well, I wouldn't be able to recite all of the names of all of our experts. There are just simply too many, and I would hate to leave somebody out.

Mr. HALL. There is a whole bunch of them that question it. Is that what you are telling me?

Dr. ANASTAS. No. I said we have many excellent scientists. I didn't say we have many excellent scientists who question it.

Mr. HALL. Okay.

Dr. ANASTAS. Let me be clear about one thing. Something that I have said from the day that I came onboard was that it is antithetical to science to have any kind of political interference with science, that scientific integrity means scientific independence, and it would be antithetical to me as a scientist, it would be antithetical to me as a member of this Administration that has pledged to engage in scientific integrity, to in any way interfere with the genuine scientific work of our experts.

Mr. HALL. Were there some in your—within the EPA that you considered experts on science that disagree with your testimony today?

Dr. ANASTAS. I have not encountered them.

Mr. HALL. So when I tell you that there is scientists within the EPA that question the science, are you saying that that is not true? You testified that there were just a little bit ago.

Dr. ANASTAS. Oh, I am not questioning you. I am just saying that I have not encountered them.

Mr. HALL. So you didn't even discuss with them then when you come to the conclusion to bring this testimony to this committee. So you have not encountered them, but they were at your disposal, and why didn't you use them? Why didn't you question them? Why didn't you ask them and give them the answers that you have given us today?

Dr. ANASTAS. I always—

Mr. HALL. If you don't think that they are exception or you don't think they are experts in their field.

Dr. ANASTAS. My greatest resource in this position is the expertise of the scientists, and I tap into that. In the two months that I have been in this position, I have been tapping into that expertise as deeply and as broadly as I can.

Mr. HALL. Now, you have some more to go if you haven't tapped into those within the EPA that don't agree with your science and don't agree with your testimony. You have some time to do that. How much longer do you plan to be with EPA?

Dr. ANASTAS. Well, I certainly will hope that through this long Administration and perhaps the next President will find me attractive as well. I—so I—

Mr. HALL. He may find you attractive, but I don't know how much he is going to believe you.

Dr. ANASTAS. I certainly—

Mr. HALL. I find you attractive—

Dr. ANASTAS. —meant scientifically and professionally.

Mr. HALL. —but I don't want to get in trouble.

Dr. ANASTAS. I certainly serve at the pleasure of the President and will look forward to continuing.

Mr. HALL. He is a good President, and my Bible tells me to pray for him, and when I pray for him, God just grins at me, acts like he doesn't believe me, that I am sincere.

Dr. ANASTAS. I believe you.

Mr. HALL. I believe you, too, and I do want you to go back and find these EPA people that question this science and have some kind of discussion with them and then when you are back here again, why maybe we will get some different testimony from you.

Dr. ANASTAS. Thank you.

Mr. HALL. I hope I haven't been rude to you in any way. I don't mean to be. I just don't like what you are doing and what you say and who you work for.

Chairman GORDON. Dr. Anastas, we—

Mr. HALL. Other than that I think you are fine.

Chairman GORDON. —recognize you have only been on the job for two months, and we thank you for coming. You have got an important job to do, and if there is no objection, then the witness is excused, and we will move to the second panel.

Panel II

I will ask rather than take a break, we are going to try to move right in so that everybody can move forward. So as we are having the changing of the guard here, I will first—I would like to introduce our NASA Administrator, Dr. Jane Lubchenco is the Administrator of the National Atmospheric and Oceanic Administration. Before joining NOAA Dr. Lubchenco was the President of the American Society for the Advancement of Science [AAAS], a professor at Harvard and Oregon State University and the MacArthur Foundation Genius Award winner. I think that is when she met Mr. Hall as a fellow genius winner.

Okay. Sorry that you had to wait so long. As I mentioned earlier, we have lots going on today, and but now we would love to hear from you, and you are recognized for as much time as you may choose.

STATEMENTS OF JANE LUBCHENCO, ADMINISTRATOR, NATIONAL ATMOSPHERIC AND OCEANIC ADMINISTRATION

Dr. LUBCHENCO. Thank you very much, Mr. Chairman, Members of the Committee. I greatly appreciate your continued leadership and support of NOAA. It is particularly important as NOAA continues to work to improve our products and services that we deliver to the American people.

As you know, on February 27 the Pacific Ocean was impacted by a tsunami event originating from an 8.8 magnitude earthquake off the coast of Chile. Fortunately, the tsunami was not as destructive as it could have been, but it provided a graphic illustration of how very far we have come in the past decade in making timely and accurate tsunami warnings and providing the public with information needed to make decisions. This event demonstrates that the continued investment in observations, modeling, research, and outreach is vital to save lives and protect property.

The President's fiscal year 2011 budget request provides a solid foundation to continue to advance NOAA's mission and for meeting our most pressing needs. The request of \$5.6 billion represents an \$806 million increase over fiscal year 2010 enacted levels and addresses a set of priorities that will guide our actions in the coming years.

I would like to highlight a couple of significant areas of progress over the last fiscal year. In the area of climate, we have continued to provide climate observations and analysis while engaging with our partners on how to strengthen our climate services. We have made important progress in rebuilding our fisheries, recovering protected species, and sustaining the livelihoods and communities that they enable.

We introduced a draft catch share policy and are committed to improving fisheries enforcement and our relationships with fishing communities and industries. We made good progress in meeting the mandates of Magnuson-Stevens Act, and we commissioned the NOAA ship *Pisces*, which will support fisheries for search in the Gulf of Mexico and the southeast U.S.

NOAA is fully engaged in the President's Interagency Ocean Policy Taskforce. The release of a draft National Ocean Policy and a framework for coastal and marine spatial planning reflect a growing recognition that healthy oceans matter and that protecting and restoring critical habitat is essential. In fiscal year 2009, NOAA's Coastal Estuarine and Land Conservation Program acquired or put under easement over 4,000 coastal acres.

The 2011 budget includes new investments to strengthen our science and foster innovation, rebuild and improve fisheries, and sustain and enhance satellite observations.

NOAA has become a global leader in reporting on the state of essential climate variables and proposes to establish a new line office called the NOAA Climate Service. I want to thank the Committee for all the support that you have given us for establishing the NOAA Climate Service.

This office will enable NOAA to better address the growing needs for climate services. Our fiscal year 2011 request includes \$435 million in support of the U.S. Global Change Research Program [USGCRP], with 77 million in new increases for core climate services and observations.

NOAA's satellites provide the data and information that are vital to every citizen in our Nation. A funding increase of \$678.6 million for a total of \$1.1 billion is requested to support the Administration's decision to restructure the NPOESS Program and create within NOAA the Joint Polar Satellite System [JPSS].

NOAA is requesting an increase of \$62.5 million for a total of \$730 million to continue the development of the GOES-R Program, to be prepared for launch near the end of 2015.

The fiscal year 2011 budget also supports NOAA's responsibilities in transforming fisheries and protecting species. This budget includes an increase of \$36.6 million to establish a National Catch Share Program. This program will provide a national framework to develop, manage, and improve catch share programs in fisheries across the Nation. This increase will also continue the transition of the Northeast Groundfish Fishery to sector management, as well as support new voluntary catch share programs in the Mid-Atlantic, Gulf of Mexico, and Pacific Coast regions.

The 2011 budget request also includes an increase of \$10.4 million in the Community-Based Restoration Program. NOAA plans to increase fish passage and spawning and rearing habitats by implementing larger scale ecological restoration in targeted areas.

We will continue supporting the Species Recovery Grant Program with a requested increase of \$9.6 million. This will allow NOAA to provide grants to conduct priority recovery actions for threatened and endangered species, including restoring habitat, monitoring population trends, developing conservation plans, and educating the public.

With a total request of \$65 million, the Pacific Coast Salmon Recovery Fund Program will continue to leverage Federal, state, and tribal resources in the Pacific Coast region to implement projects that will store and protect salmonid populations and their habitats.

NOAA's fleet plays a central role in accomplishing NOAA's mission. The fiscal year 2011 budget continues the recapitalization of NOAA's fleet, critical for data collection to meet fishery management's mandates.

Overall, our 2011 budget request reflects the commitment to the President and the Secretary to public safety, a healthy environment, sound science, underpinning decision making, and job creation. These resources are critical to the future success of meeting our needs in climate, fisheries, coasts, and oceans, and I very much look forward to continuing to work with this committee and addressing any questions you may have.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Lubchenco follows:]

PREPARED STATEMENT OF JANE LUBCHENCO

Chairman Gordon, Ranking Member Hall, and Members of the Committee, before I begin my testimony I would like to thank you for your leadership and the generous support you have shown the National Oceanic and Atmospheric Administration. Your continued support for our programs is appreciated as we work to improve our products and services for the American people.

NOAA's mission and priorities support Secretary of Commerce Gary Locke's priorities through innovation in science and technology, services benefiting the economy and ecosystems, and green and blue businesses underscored by a solid foundation of environmental information and stewardship. A healthy environment and a strong economy go hand in hand. Recreational and commercial activities, representing billions of dollars in economic impact, depend on healthy coastal, ocean and fresh water environments and the services they provide. NOAA is assisting communities with the data, tools, technology, training, and essential services and knowledge needed to make decisions in diverse disciplines and sectors—from the innovative management of our natural resources to the investments we make in public infrastructure.

I am honored to be here as the Under Secretary for Oceans and Atmosphere at the National Oceanic and Atmospheric Administration (NOAA), one of the Nation's premiere environmental science and stewardship agencies. I am pleased to speak with you today regarding the President's Fiscal Year (FY) 2011 Budget Request for NOAA.

The FY 2011 President's Budget provides a solid foundation to continue to advance NOAA's mission. This is a critical budget for the Administration and NOAA, and provides support for meeting our most pressing needs. The FY 2011 request is \$5.6 billion, representing an \$806 million increase over the FY 2010 enacted level. After careful consideration of the key issues facing the Nation in which NOAA is mandated to and able to respond, we developed a set of priorities that helped to shape this budget and will guide our actions in the coming years. These priorities include ensuring the continuity of climate, weather, and ocean observations; eliminating overfishing and ensuring the sustainability of marine fisheries; strengthening climate science and services; promoting healthy and resilient coastal communities and ecosystems; improving weather forecasts and disaster warnings; and strengthening Arctic science and stewardship. Before discussing the details of this budget request, it is important to document some significant areas of progress over the last fiscal year.

FY 2009 ACCOMPLISHMENTS

Climate

In the area of climate, we have continued to provide climate observations and analysis while engaging other Federal agencies, the private sector, the science community, and many others on how to strengthen our climate services. In FY 2009, NOAA calculated sea-level trends for an additional 70 global stations. We also deployed ten additional Historical Climate Monitoring sites to provide high resolution regional climate data. Climate studies by NOAA scientists showed that changes in surface temperature, rainfall, and sea level are largely irreversible for more than 1,000 years after carbon dioxide emissions are completely stopped, and Arctic summers may be ice-free in as few as 30 years.

Satellites

We are working to resolve many of the management challenges that will allow us to get our future polar satellite program "back on track." These management challenges go back many years and resulted in significant delays and cost overruns. We still have a great deal of work to do, but this attention is critical to the continuity of the nation's weather and climate information. In FY 2009, our other satellite programs saw major milestones accomplished with the launch of NOAA-19, a polar-orbiting satellite, and GOES-14, a geostationary satellite. These satellites are critical for NOAA's weather-forecasting, storm-tracking, and space- and climate-monitoring missions. NOAA satellites also provided key support in the rescue of 184 people throughout and near the United States during FY 2009, providing their location to emergency responders.

Weather

Concern for public safety drives NOAA to continue to improve the timeliness and accuracy of warnings for all weather-related hazards. NOAA is committed to enhancing timely and accurate weather and climate forecasts through better observations, improved data assimilation, and collaboration with the research community. To this end, NOAA alerted the communities in Upper Mid-West in early February of record flooding they would experience in late March and April in the Red River Valley. NOAA also provided a Winter Outlook in early October which has been spot-on in advising the American public of the conditions expected through February, including the El Nino-driven storms which have swept through the southern tier of the Nation, bringing heavy rains, snow and flooding from California to the Mid-Atlantic since December.

Fisheries

We have made important progress in rebuilding our fisheries, recovering protected species and sustaining the livelihoods and communities dependent upon them. We introduced a draft catch share policy and are committed to improving relationships with the recreational and commercial fishing communities. We are exploring ways to improve fisheries enforcement efforts, as well as the science used to inform fisheries management decisions. We are also considering ways to expedite *Endangered Species Act* consultations to allow projects to move forward more quickly while en-

suring needed species protections. In FY 2009, NOAA continued to make progress in meeting the mandates of the *Magnuson-Stevens Fishery Conservation and Management Reauthorization Act*. NOAA also commissioned the NOAA Ship *Pisces*, which will support fisheries research in the Gulf of Mexico and the Southeast United States.

Oceans and Coasts

NOAA was fully engaged in the President's Interagency Ocean Policy Task Force, participating in and supporting every public hearing and attending every working group and Task Force meeting. The result of the Task Force's effort was the release of a draft national ocean policy and interim framework for coastal and marine spatial planning, the first time any Administration has so clearly committed to the ideal that "healthy oceans matter." Protecting and restoring critical habitat is essential for healthy oceans. In FY 2009, NOAA's Coastal Estuarine and Land Conservation Program acquired or put under easement over 4,000 coastal acres.

ARRA Stimulus Funding

The distribution and management of funding made available through the *American Recovery and Reinvestment Act of 2009* (ARRA) is a success story for NOAA, as are the results of our projects. NOAA has obligated approximately 70 percent of the \$830 million received. We have met all of our planned milestones and expect to obligate the remaining funds in the coming months. With this funding, we have infused new resources into the economy and also invested in critical infrastructure to meet NOAA's mission needs. I am particularly proud of our efforts to restore habitat, creating jobs as we restore ecosystems. We awarded 50 grants for marine and coastal habitat restoration in 22 states and territories, obligating \$155.4 million. Many of these projects were located in areas of high unemployment and have provided jobs to Americans during a critical phase of our economic recovery. For example, NOAA grant recipients reported creating or saving 372 jobs for the period of October 1 through December 31, 2009.

The progress we have made toward our strategic priorities and the improvements made to NOAA's core functions and infrastructure set the stage for even more success in the years to come.

FY 2011 BUDGET REQUEST HIGHLIGHTS

The FY 2011 Budget reflects NOAA's efforts to focus on program needs leading to measurable outcomes, identify efficiencies, and ensure accountability. The budget includes new research and development investments to strengthen our science (including climate) mission and foster innovation; provides investments to rebuild and improve fisheries and the economies and communities they support; and proposes targeted investments to sustain and enhance satellite observations, including a major realignment of our NPOESS program.

Meeting the Rising Demand for Climate Services

President Obama has made it clear that addressing climate change is a high priority, and that good government depends on and should be informed by strong scientific knowledge. NOAA has become a global leader in reporting on the state of essential climate variables. NOAA proposes to establish a new line office called NOAA Climate Service. This office would bring together NOAA's longstanding and outstanding capabilities—Nobel Peace Prize award-winning researchers and assessments, observations, predictions, training and vital on-the-ground climate services delivery to users in climate-sensitive sectors and economies. A single climate office, rather than the current dispersed structure, will enable NOAA to better address the growing need for climate services. NOAA's FY 2011 request includes \$435 million in support of the U.S. Global Change Research Program, with \$77 million in new increases for core climate services and observations (excluding increases for geostationary and polar-orbiting satellites) needed to enable the Nation to more effectively address the impacts of climate change. Climate science encompasses an immense breadth of topics ranging from those that are well understood and documented, such as greenhouse gases, to those on the cutting edge of knowledge, such as ocean acidification and melting sea ice.

For example, the increasing acidity of the world's oceans has the potential for devastating effects on marine life and ocean ecosystems, but the degree to which various organisms may be capable of adapting to a more acidic environment is uncertain. More investments in ocean acidification are required to reduce this uncertainty and consider means to respond and/or adapt. In FY 2011, NOAA requests an increase of \$6.1 million, for a total of \$11.6 million, to support new technologies and

ecosystem monitoring systems to better assess the physiological and ecosystem level effects of ocean acidification on productivity and the distribution of commercial and recreational marine fish stocks.

The impacts of climate change are evident on both a global and local scale. The Arctic, in particular, is an emerging area of international concern, as it continues to experience profound atmospheric, terrestrial, and oceanic changes related to climate variability and change. With an increase of \$3 million, for a total of \$6.3 million requested in FY 2011, NOAA will improve and amplify representation of Arctic climate processes in global climate models, strengthen our network of observations, and provide user-focused research assessments for the region.

Scientific assessments are integral for enhancing our understanding of climate—both to determine how and why climate is changing, but also what the changing conditions mean to our lives and livelihoods. NOAA will provide climate assessments on both the regional and national levels to meet society’s increasing demand for climate data and information. A requested increase of \$10 million will establish regional and national assessments that will synthesize, evaluate, and report on climate change research findings, evaluate the effects of climate variability and change for different regions, and identify climate risks and vulnerabilities.

Strong scientific assessments incorporate information provided by NOAA’s climate models and carbon observing systems. Climate models are the only means of estimating the effects of increasing greenhouse gases on future global climate. In FY 2011, NOAA requests an increase of \$7.0 million, for a total of \$9.6 million, to continue development of Earth system models to address urgent climate issues such as sea level rise, feedbacks in the global carbon cycle, and decadal predictability of extreme events. An increase of \$8.0 million, for a total of \$20.9 million, will allow NOAA to continue implementation of the Carbon Tracker Observing and Analysis System, which is an observational and analysis network that measures carbon dioxide and other greenhouse gases. This system will serve as the backbone for verifying greenhouse gas emission reduction and mitigation efforts in North America.

Improve Satellite Observations and Management

NOAA’s satellites provide the data and information that are vital to every citizen in our Nation—from weather forecasts, to safe air, land, and marine transportation and emergency rescue missions, we all use satellite products in our everyday life. One of the greatest challenges that NOAA faces today is ensuring continuity of satellite data and operations to provide state-of-the-art, unbroken coverage that supports weather and marine forecasting; climate assessments and change predictions; and space weather forecasts. With the FY 2011 budget request, we will invest in multiple satellite acquisition programs for the continuity of critical weather, climate, and oceanographic data.

A funding increase of \$678.6 million, for a total of \$1.1 billion, is requested to support the Administration decision to restructure the NPOESS program and create within NOAA the Joint Polar Satellite System. This large increase reflects the Administration’s determination that beginning in FY 2011, NOAA will fully support within its own budget the procurement and development of the assets for the afternoon orbit. Restructuring the NPOESS program will allow NOAA to continue the development of critical earth observing instruments for the afternoon orbit, which are required for improving weather forecasts, climate monitoring, and warning lead times of severe storms. The restructured program separates civilian and military satellite procurements, but retains sharing of common assets such as the ground system and data. The National Aeronautics and Space Administration (NASA) will serve as the lead acquisition agent for NOAA, continuing the long and effective partnership on all of our polar-orbiting and geostationary satellite programs to date. There is still much work that remains, but NOAA is committed to working with our partners to ensure a smooth transition to assure the continuity of Earth observations from space.

NOAA is requesting an increase of \$62.5 million, for a total of \$730 million, to continue the development of the Geostationary Operational Environmental Satellite—Series R (GOES–R) program. This increase will provide for the continued development of six GOES–R satellite instruments, the spacecraft, and ground systems to be prepared for launch near the end of 2015. The acquisition of NOAA’s GOES–R series, in partnership with NASA, is progressing on track. The new satellites will carry improved environmental sensors to enable NOAA’s forecasters to enhance the timeliness and accuracy of their severe weather warnings. Also, this next generation of GOES satellites will provide advances in NOAA’s observation capabilities, including improvements to coastal ecosystems, space weather, and lightning observations through continued funding of instruments such as the Advanced Baseline Imager,

Solar Ultra Violet Imager, Extreme Ultra Violet Sensor/X-Ray Sensor Irradiance Sensor, Space Environmental In-Situ, and Geostationary Lightning Mapper.

Global sea level rise directly threatens coastal communities and ecosystems through increased exposure and erosion, more frequent storm-surge and tidal flooding, and loss of natural habitat due to drowned wetlands. NOAA's budget requests an additional \$30.0 million for a total of \$50 million to continue development of the Jason-3 satellite that will provide continuity of sea surface height measurements, thus ensuring an uninterrupted climate record of over 20 years. The Jason-3 mission is a joint U.S.-European partnership with U.S. and European funding.

NOAA requests a \$3.7 million increase to partner with the Taiwan National Space Organization for the launch of 12 satellites to replenish and upgrade the Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC) satellite constellation. This program is a cost effective means of obtaining information about the temperature and moisture in the atmosphere around the globe that will improve forecasting accuracy.

Finally, a requested increase of \$9.5 million will support, in cooperation with NASA, the refurbishment of the existing NASA Deep Space Climate Observatory (DSCOVR) satellite, its solar wind sensors, and the development of a Coronal Mass Ejection (CME) Imager. The data and information provided by DSCOVR will support the operations of the National Weather Service Space Weather Prediction Center, which generates accurate and timely 1-4 day forecasts and warnings of geomagnetic storms that could adversely affect power grids, telecommunications, the health and safety of astronauts, and the viability of satellite systems.

Transform Fisheries and Recover Protected Species

Ending overfishing, improving fisheries management and putting fisheries on a path to sustainability and profitability are still challenges for NOAA. I would like to highlight areas in the FY 2011 budget that support targeted investments to continue fulfilling NOAA's responsibilities under the *Magnuson-Stevens Fishery Conservation and Management Reauthorization Act*, and that will help to sustain local communities while restoring a number of vital fisheries stocks and habitats.

NOAA recently released a draft catch share policy to encourage the consideration and adoption of catch shares wherever appropriate in fishery management and ecosystem plans and amendments, and will support the design, implementation, and monitoring of catch share programs. Catch share programs give fishermen a stake in the benefits of well-managed fisheries, and therefore greater incentive to ensure effective management. To support NOAA's policy, this budget includes an increase of \$36.6 million, for a total request of \$54 million, to establish a National Catch Share Program. This program will provide a national framework to develop, manage, and improve catch share programs in fisheries across the Nation. This increase will also continue the transition of the Northeast ground fish (multispecies) fishery to sector management as well as support new voluntary catch share programs in the Mid-Atlantic, Gulf of Mexico, and Pacific Coast regions.

Managing fisheries to their full potential requires additional efforts focused on habitat condition and ecosystem functioning, which provide the foundation for species recruitment and survival. The FY 2011 budget request includes investments in this area through three vital NOAA programs that are focused on threatened and endangered species, but will have a resonating impact across broad goals for enhancing ecosystem integrity and health. First, through the Community Based Restoration Program, NOAA plans to increase fish passage and spawning and rearing habitat by implementing larger-scale ecological restoration in targeted areas such as wetlands. NOAA is requesting an increase of \$10.4 million for a total of \$23.8 million for this effort in FY 2011. Second, we will continue supporting the Species Recovery Grants Program in FY 2011 with a requested increase of \$9.6 million, for a total of \$20.8 million. This will allow NOAA to provide grants to conduct priority recovery actions for threatened and endangered species, including restoring habitat, monitoring population trends, developing conservation plans, and educating the public. Third, with a total request of \$65 million, the Pacific Coastal Salmon Recovery Grants Program will continue to leverage Federal, state, and tribal resources in the Pacific Coast region to implement projects that restore and protect salmonid populations and their habitats.

Another highlight of the FY 2011 request includes support for the restoration and protection of the Nation's largest estuary, the Chesapeake Bay. NOAA supports the President's Executive Order to restore the Chesapeake Bay by providing enhanced understanding of the relationships between the Bay's living resources and habitat, coordinating protection and restoration of key species and habitats across jurisdictional lines, and supporting a coordinated system of monitoring platforms distributed across the Bay. We are requesting an increase of \$5 million, for a total of \$7.1

million, for regional studies in the Bay. This investment will ensure NOAA has state-of-the-art field and laboratory equipment in place in FY 2011, which will be used to address the mandates of the President's Executive Order in FY 2011 and beyond.

In addition to expanding scientific understanding in the Chesapeake Bay, NOAA scientists are developing integrated ecosystem assessments (IEA), a critical tool for understanding the interactions between multiple species and for helping to manage and sustain critical stocks and habitats. IEAs allow managers to weigh trade-offs between sectoral uses and evaluate the socioeconomic implications of management actions. Most importantly, IEAs provide guidance to ensure the most cost-effective and informed resource management decisions. In FY 2011, NOAA is requesting an increase of \$5.4 million, for a total \$7.5 million investment, to focus primarily on the California Current Ecosystem, but to also engage work on the Gulf of Mexico and Northeast Shelf IEAs.

Vibrant Coastal Communities and Economies

It was estimated that in 2003, approximately 153 million people—or 53 percent of the Nation's population—lived in the 673 U.S. coastal counties, an increase of 33 million people since 1980. It is estimated that this number will increase by 12 million people by 2015. In addition, over half of the U.S. Gross Domestic Product is generated in coastal counties, highlighting their critical importance to the Nation's economy. This population increase is straining the limited land area of coastal counties. Coupled with the important economies of coastal areas and the demands for ecosystem services, it is becoming increasingly difficult to manage coastal resources in the context of competing uses. NOAA's FY 2011 budget provides key investments to promote sustainable, safe use of coastal areas and to support the economies of these coastal areas.

As stated in the interim report of the Interagency Ocean Policy Task Force, current and future uses of ocean, coastal, and Great Lakes ecosystems and resources should be managed and effectively balanced. I would like to highlight areas in our request that support this goal and other Administration priorities.

Human uses of ocean resources are accelerating faster than our ability to manage them. Increasing conflicts are unavoidable as demands increase for ocean-based energy, marine aquaculture, commercial and recreational fishery products, shipping and navigation services, and other activities. The Administration's Interagency Ocean Policy Task Force released the Interim Framework for Effective Coastal and Marine Spatial Planning in December 2009, which is aimed at enhancing and streamlining ocean management decisions to ensure the health of vital ocean ecosystems as human uses increase. Current management approaches are ad hoc and fragmented at the Federal, state, and local levels. NOAA is a leader in providing tools and services that support coastal and marine spatial planning efforts. Our existing programs have established a foundation for coastal and marine spatial planning that could be used government-wide across jurisdictions and sectors. In FY 2011, NOAA requests an increase of \$6.8 million to support coastal and marine spatial planning, which will enhance existing efforts for sustainable fisheries, safe navigation, improved water quality, living marine resources and critical habitat protection.

NOAA's request further supports coastal and marine spatial planning efforts with a \$2 million increase to support the Gulf of Mexico Coastal and Marine Elevation Pilot to a develop robust geospatial framework, including high-resolution topographic and bathymetric datasets. These datasets will provide a better understanding of baseline variables needed to enhance coastal community resilience, wetland loss and erosion, and the potential for degradation of key ecosystem services. This pilot will begin in the Gulf of Mexico and be extended to other regions and applications over time.

The Nation's coastal communities and economies depend on healthy coastal resources, which are threatened by fragmented planning and management of societal use of coastal lands and waters. Regional ocean governance mechanisms facilitate the effective management of ocean and coastal resources across jurisdictional boundaries by improving communications, aligning priorities, and enhancing resource sharing between local, state, and Federal agencies. Our request of a \$20 million increase will establish a competitive grants program to advance effective ocean management (including coastal and marine spatial planning) through regional ocean governance. The program will help support priority actions, in association with states, identified in plans of the existing regional ocean partnerships. Support for these partnerships will also encourage development of comprehensive, coastal and marine spatial plans, which are consistent with the President's Ocean Policy Task Force Interim Framework for Effective Coastal and Marine Spatial Planning.

To better protect the public health of our coastal citizens and tourists, NOAA requests an increase of \$9.5 million, for a total of \$12.5 million, to support research into technologies that better detect, identify, characterize, and quantify disease-causing microbes, toxins, and contaminants in marine waters. These funds will be used to target sensor development, which will support ocean and coastal related Health Early Warning Systems, identify risks, and promote public health.

In addition to public health hazards, coastal communities are vulnerable to hardship and costs associated with episodic and chronic natural hazards, such as hurricanes, sea-level rise, and coastal erosion. Our request of a \$4 million increase will support the development of tools, such as web portals, Geographic Information System (GIS) products, and forecast models, to help coastal communities mitigate the impacts of climate and weather hazards.

Ensure Timely Weather Forecasts

Weather impacts our lives and the economy. The United States experiences a broader variety of severe weather than any other Nation on Earth, from hurricanes in the south, east, and west, to arctic storms in the north. Each year, NOAA provides 76 billion observations, 1.5 million forecasts, and 50,000 warnings to mitigate the impact of weather events and protect life and property. The FY 2011 Budget Request proposes important increases in both weather operations and weather research.

Weather is a factor in over 70 percent of air-traffic delays, costing approximately \$29 billion annually¹. Two thirds of all weather delays are preventable with more accurate and timely weather information. To meet the rising demands of air transportation, NOAA is involved in a collaborative partnership with the Federal Aviation Administration to create the Next Generation Air Transportation System. NOAA requests an increase of \$15.1 million, for a total of \$26.7 million, to modernize our aviation weather forecasts and warnings. This funding will provide much needed improvements to processing systems and models, as well as new products for pilots.

NOAA is dedicated to continually upgrading existing weather tools to keep up with growing needs and improved technologies, as well as investing in research to develop new products. NOAA requests an increase of \$3.2 million, for a total of \$11.1 million, to install additional components to the Nation's fleet of NEXRAD Doppler weather radars to improve their accuracy in determining the quantity and type of precipitation. Doppler weather radar is the primary tool used to issue local storm warnings for flash floods, tornadoes, and severe thunderstorms. Looking to the future, NOAA also requests an additional \$6 million, for a total of \$10 million, to continue developing Multi-Function Phased Array Radar technology, which shows great promise as the next major improvement in weather detection. These funds will examine the benefits and efficiencies associated with this next-generation radar technology. Multi-Function Phased Array Radar's ability to rapidly scan large areas could provide an enormous advantage to radar meteorologists over current capabilities, and in turn enhance weather and climate warnings for the public.

Water resource and precipitation monitoring and forecasting have become a particular challenge with increases in population, drought, and frequent changes in commercial shipping needs. On an annual basis, the majority of federally declared disasters are due to flooding. In FY 2011, NOAA requests an increase of \$7.7 million for a total of \$12.9 million, to research, develop, and deliver water forecasting services for river, estuary, and coastal areas that do not currently have these capabilities.

In addition, the FY 2011 Budget includes \$2 million, for a total of \$13 million, for the national Space Weather Prediction Center (SWPC). Millions of precision Global Positioning System users, satellite operators, commercial and military space and aviation activities, and power grid operations will be vulnerable to a new round of solar storms during the predicted upcoming solar maximum. This investment will improve information technology systems at the SWPC and enhance space weather alerts and warnings to avoid potential disruptions to the Nation's shared infrastructure on which the public relies.

Finally, NOAA requests an additional \$2.2 million, for a total of \$14.5 million, to provide a necessary technology refresh and frequency conversion for our network of wind profilers. This 20-year-old system provides high-frequency wind data for severe

¹ See the Federal Aviation Administration's Research, Engineering and Development Advisory Committee's *Report of the Weather-ATM Integration Working Group*, 3 Oct, 2007; available at <http://www.jpdo.gov/library/FAA-REDAC-Report.pdf>

weather warnings and watches of tornadoes, flash floods, and winter storms, short-term forecasts, and detection of volcanic ash plumes.

Program Support

In order to deliver sound science and services, NOAA must continue to invest in its information technology (IT) infrastructure, the quality and construction of NOAA facilities, and recapitalization. NOAA experiences thousands of cyber attacks every month. A requested increase of \$8.7 million will enhance security monitoring and response capabilities, and consolidate our IT infrastructure into a single enterprise network. In addition, NOAA needs to continue to replace key facilities to ensure employee safety and maintain mission continuity. This budget includes an increase of \$14 million for the Pacific Regional Center which brings together NOAA programs on Oahu, Hawaii. While the *ARRA* funds we received in FY 2009 helped fund basic construction of the facility, additional funding is needed in FY 2011 to procure and install the information technology infrastructure for the new facility. The budget also includes an increase of \$5 million to support the replacement of the bulkhead at NOAA's Atlantic Marine Operations Center.

NOAA's fleet plays an essential role in accomplishing NOAA's environmental and scientific missions. The FY 2011 budget continues the recapitalization of NOAA's fleet, critical for data collection to meet fisheries management mandates. A \$6.2 million increase is requested to address vessel maintenance backlog, and to increase preventative maintenance rates for the fleet. An additional \$7.4 million is requested to accelerate a planned FY 2013 Major Repair Period to address structural, mechanical, and electrical breakdowns of the *Miller Freeman*. Lack of repair to this valuable ship would result in lost days at sea and impact NOAA research. Finally, we request \$3 million towards the design of a fishery survey vessel to replace the *OREGON II*, an aging fishery survey vessel operating in the Gulf of Mexico. Another \$1.4 million is requested for project management of a new fishery survey vessel that is being built using *ARRA* funding.

CONCLUSION

Overall, NOAA's FY 2011 Budget Request reflects the commitment of the President and the Secretary to public safety, a healthy environment, sound science underpinning decision making, and job creation. These resources are critical to the future success of meeting our needs in climate, fisheries, coasts, and oceans. I look forward to working with you, the Members of this Committee, and our constituents to achieve the goals I've laid out here through the implementation of the FY 2011 budget.

Thank you for the opportunity to present NOAA's FY 2011 Budget Request. I am happy to respond to any questions the Committee may have.

BIOGRAPHY FOR JANE LUBCHENCO



On March 20, 2009, Dr. Jane Lubchenco, a marine ecologist and environmental scientist, was sworn in as the ninth and first woman Administrator of NOAA. Her scientific expertise includes oceans, climate change, and interactions between the environment and human well-being. Raised in Denver, she received a B.A. degree

in biology from Colorado College, a M.S. in zoology from the University of Washington and a Ph.D. in ecology from Harvard University. While teaching at Harvard (1975–1977) and Oregon State University (1977–2009), she was actively engaged in discovery, synthesis, communication, and application of scientific knowledge.

Dr. Lubchenco has studied marine ecosystems around the world and championed the importance of science and its relevance to policy making and human well-being. A former president of the American Association for the Advancement of Science (AAAS), the International Council for Science and the Ecological Society of America, she served ten years on the National Science Board (Board of Directors for the National Science Foundation). From 1999–2009 she led PISCO, a large four-university, interdisciplinary team of scientists investigating the large marine ecosystem along the coasts of Washington, Oregon and California. She has a special interest in Arctic ecosystems, with recent work in Svalbard, Greenland and the Alaskan arctic.

Dr. Lubchenco has provided scientific input to multiple U.S. Administrations and Congress on climate, fisheries, marine ecosystems, and biodiversity. Dr. Lubchenco served on the first National Academy of Sciences study on ‘Policy Implications of Global Warming’, providing advice to the George H.W. Bush administration and Congress. In 1997 she briefed President Clinton and Vice President Gore and Members of Congress on climate change.

Her scientific contributions are widely recognized. Eight of her publications are ‘Science Citation Classics’; she is one of the ‘most highly cited’ ecologists in the world. Dr. Lubchenco is an elected member of the National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society, and four international academies of science: the Royal Society, the Academy of Sciences for the Developing World, Europe, and Chile. She has received numerous awards including a MacArthur (‘genius’) Fellowship, twelve honorary degrees, the 2002 Heinz Award in the Environment, the 2005 AAAS Award for Public Understanding of Science and Technology and the 2008 Zayed International Prize for the Environment.

Dr. Lubchenco co-founded three organizations that communicate scientific knowledge to the public, policy makers, the media and industry: (1) The Leopold Leadership Program (teaches environmental scientists to be effective communicators), (2) COMPASS (the Communication Partnership for Science and the Sea, communicates marine sciences); and (3) Climate Central (a non-advocacy source of understandable scientific information about climate science and solutions). She co-chaired the Synthesis for Business and Industry of the Millennium Ecosystem Assessment, an international scientific evaluation of the consequences of environmental changes to human well-being. She also served on the Pew Oceans Commission, the Joint Oceans Commission Initiative, the Aspen Institute Arctic Commission and the Council of Advisors for Google Ocean.

GREENHOUSE GAS MONITORING AND VERIFICATION

Chairman GORDON. Thank you, Dr. Lubchenco. At this point we will begin the first round of questions. The Chair recognizes himself for five minutes.

This morning I read that China had sent letters to the IPCC asking to join in the Copenhagen Agreement with their own voluntary reductions in carbon. So whether or not it is voluntary, whether it is regulatory, or legislative, most countries now in the world recognize that climate change is real and that human activities and carbon is a major function in that.

So all, you can all have the best goodwill, but there has to be some kind of verification, both scientific verification and independent verification. What are the tools that NOAA has in that regard? More particularly, what is NOAA’s role in developing a network for greenhouse gas verification monitoring? What are the current capacities and future needs to support monitoring and verification, and how is agency partnering with other Federal agencies and international partners for this area of verification?

Dr. LUBCHENCO. Mr. Chairman, NOAA has a key role in the set of observing and monitoring networks that measure greenhouse

gases within the United States and globally. We partner with other agencies so that each agency does different but complimentary things, and there is an interagency working group that is taking stock of the collective assets that we all have.

What is abundantly clear is that it is important to have monitoring at two different types of platforms. Some of the monitoring that NOAA does, for example, is land-based with towers that are sampling ambient air, some of what we do are airplane flights that sample air from a higher level than you can just from a tower, and some of the information that is gained from other agencies is more calculating what likely emissions are based on activities. For example, determining how much greenhouse gas a power plant generates, and then scaling that up.

I think it is commonly agreed that you need both the bottom up side, such as what do we think is likely to be released, but also the ambient monitoring from the ground, from planes, as well as from satellites. You need a combination of complimentary monitoring systems to be able to work toward the kind of international verification and monitoring that you suggest and I agree will be needed.

Chairman GORDON. Well, with the assets that we have now what level of verification, you know, would you say that we have? What is our ability now?

Dr. LUBCHENCO. We do not have the current—we have good capabilities to do a lot of monitoring. It is probably insufficient to do the kind of global monitoring that will be needed if there is some kind of international agreement about global reductions of emissions.

Chairman GORDON. And what additional assets do we need and how, if the Chinese, for example, or any country would not allow us to have point of source or the towers or anything of that nature and you are not able to have any type of a fly-over, what—how can we monitor those areas?

Dr. LUBCHENCO. There are various discussions underway about what additional capabilities we have that we don't now have. That discussion is underway, and I am not prepared to describe exactly what we need because the agencies are in the process of producing that.

Chairman GORDON. What kind of timeframe would you project to, again, having those assets in place, whatever they might be?

Dr. LUBCHENCO. I don't know the answer to that, but I will inquire and get back to you.

Chairman GORDON. My time is about up. I want to—we will have a further discussion about the Climate Service another time, but now I would like to recognize Mr. Hall.

Mr. HALL. Thank you, Mr. Chairman.

ESTABLISHING THE NATIONAL CLIMATE SERVICE

Ms. Lubchenco, Dr. Lubchenco, maybe you can help me a little bit. I want to ask you a question or so, and when I say NOAA, I presume a NOAA proposal probably had your agreement or agreement of you and your committee or those who advise you. Is that a correct statement? I am trying to decide whether that is your pro-

posal or the proposal of a group or office people that studied and done some reports back to you.

Dr. LUBCHENCO. Is there a specific proposal to which you are referring?

Mr. HALL. Yes, madam. The proposal to create a Climate Service office was presented to Congress a week after the budget has been released. That is correct, isn't it?

Dr. LUBCHENCO. That is correct.

Mr. HALL. And at that time NOAA informed the Committee that it had no intention of seeking our approval. We got a good Chairman, we got a good committee here, we have been favorable to you and listened and relied on directors and under secretaries of the past, and I have no argument with NOAA as I have with EPA.

But at that time NOAA informed us that they had no intention of seeking our approval as the authorizing committee. Instead, you planned to go directly to the Appropriations Committee to request a reprogramming.

I guess my question is why are you not seeking our approval of the proposal? Do you have some reason to think we wouldn't grant it?

Dr. LUBCHENCO. Thank you so much for asking that, Congressman. I really appreciate the opportunity to clarify this.

This committee has been strongly supportive of the needs for Climate Services across the Federal Government. NOAA is also strongly supportive of that and views it as an important inter-agency effort.

Our announcement on—in early February was the intent to do an internal reorganization to better position ourselves within NOAA to be a better partner with the other agencies and to work toward the suite of Climate Services that we believe the country needs.

NOAA currently has very significant climate science expertise and delivery of services, but they are scattered in multiple places throughout the organization, and our proposal was for an internal reorganization to pull those pieces together. Because that is a reprogramming, the process to be used for a reprogramming is—

Mr. HALL. Could you just get right to the answer? Why are you not seeking our approval of your proposal? Do you have a reason to believe we wouldn't grant it or that we were not capable of granting it or that it is not our position to grant it or refuse it?

Dr. LUBCHENCO. That is just what I was getting to.

Mr. HALL. Well, but I have just five minutes, and I have got to be somewhere—

Dr. LUBCHENCO. I apologize.

Mr. HALL. —at 5:00 this afternoon.

Dr. LUBCHENCO. I apologize. But the reprogramming entails approval by the Department and by OMB and approval by the Appropriations Committee. That is what a reprogramming entails. We greatly look forward to working with this committee and with others who are interested in the Climate Service to think strategically about what it should look like, to be informed by the NAPA [National Academy of Public Administration] study that is underway, and to think about how it relates to other activities and other agencies.

So it is not at all intended to dismiss the very important role that this committee plays or this committee's interest or responsibilities.

Mr. HALL. As an authorizing committee it is our responsibility, and I think you must know this, to examine and oversee a policy shift of this magnitude, and by circumventing this committee's authority, you have made it very difficult for a lot of us to even support the plan.

Now, what do you think the appropriate course ought to be for Congress to approve of a reorganization of this size?

Dr. LUBCHENCO. Congressman, we are not proposing a major policy shift, and we absolutely do not intend to ignore the responsibilities of this committee. The proposal that we announced is an internal reorganization of existing assets. We currently do climate science and provide climate services, but they are distributed in multiple places, and we are simply bringing those together into a single new line office. So it is not a major policy shift.

Mr. HALL. Well, let us see here. The reprogramming authority of the Appropriations Committee is intended to allow for a reorganization of agencies, usually in the form of creating new reporting alignments. The major reorganization you are proposing, and it is referred to as a major reorganization you are proposing, the creation of the Climate Service office I think is more significant and more high-profile than most of the reprogramming requests that I have seen. Is that a good statement or is that not, just not true?

Dr. LUBCHENCO. I don't have the experience to know that. I certainly defer to your judgment on that. I think I would simply emphasize our willingness and intent and plea to work with this committee so that we can end up in a place that acknowledges the important role that this committee plays and should play as we look to the kinds of climate services that will be needed for this country in the future.

Mr. HALL. But by circumventing the Committee's authority I think you made it very difficult for us. Do you understand why you have made it difficult for us, and what do you think the appropriate course should be for Congress to approve a reorganization of this size? However great or however small, it is important to us to know these things to where we can support you because we rely on you.

And I am not arguing with you. I just wonder what your thinking is and why you went out of your way to discard the support of this committee. We have always supported NOAA, pretty well. I don't have the problems with you nor with your position that I have with the EPA. I am trying to find out why you wouldn't want this committee and to have the source and the strength of this committee supporting the moves that you are making, if you are proud of those moves and you think they are proper and—I just can't figure why you would bypass us.

Dr. LUBCHENCO. Congressman, that was not the intent to bypass you, and I apologize that that has been the conclusion. It was my understanding that the reprogramming that we have proposed goes through a series of steps, and that is what we were following. But there is absolutely no intention of not seeking guidance from this committee. This committee has been very, very supportive of this,

and I greatly appreciate that, and I am sorry that we have gotten crosswise on this, because I think we have the same goal in mind, and I would very much like to work with you as we consider how to do this.

Mr. HALL. Well, I certainly accept that, but I think when you highlight your ignoring this committee, you are going to bring on some observation and searching and questions as to those that didn't have the opportunity to be here and hear your explanation.

I yield back my time, Mr. Chairman.

Chairman GORDON. Thank you, Mr. Hall.

I will say the Administrator is also new to her job, and I think her feet are now wet and we will have further discussions about the—about this agency. I know we may not be unanimous in where we wind up, but it needs to be discussed, and I think this committee will have to take action if there is going to be inter—multiple agencies working together, which I think is—will be necessary to be effective.

Dr. Baird is recognized.

Mr. BAIRD. Thank you, Mr. Chairman. I want to begin by associating myself with the concerns of Ranking Member from Texas. We have chatted about this. This committee, the Subcommittee that I chair had hearings. You were present at one. We passed a bill out with the intent, at least on the House side, of what the Climate Service would look like if it were to be created, and then were taken by surprise when we learned that you already had your own plans, which is okay, I suppose, although I share Mr. Hall's concern. I think we have a responsibility as an Article I branch to oversee this and to learn that in spite of our efforts to try to support what I thought were desires of NOAA, we were unpleasantly surprised.

And so I will affiliate myself with the remarks of Ranking Member Hall on that. I want to move onto another topic, but I want to put that marker down that we take that responsibility very seriously, and we hope you will as well.

OCEAN ACIDIFICATION

I am pleased to see that there is a significant increase in funding for ocean acidification on a more positive note. We—I doubt you are aware, watching the prior testimony maybe you were, if you had been, there was a rather spirited discussion about the climate change issue, and you are unquestionably one of the most respected ocean scientists in the world in my judgment, and your resume which the Chairman read at the start speaks for itself.

How serious do you think the issue of ocean acidification is, and do you think it is related to human, to anthropogenic CO₂?

Dr. LUBCHENCO. Congressman, I believe that ocean acidification is one of the most serious issues facing us. It—we know that the oceans have increased in level of acidity by 30 percent since the beginning of the Industrial Revolution. We know that the reason that it is increasing in acidity is that carbon dioxide is being absorbed by the oceans from the atmosphere, and as carbon dioxide goes into water it makes it more acidic very simply. And that, in turn, creates very serious challenges for at least some very important marine life, ranging from microscopic plants to corals to many animals

and plants, anything that has a shell or a skeleton made of calcium carbonate.

We don't begin to understand the full consequences of this increase in acidity. It underscores the urgency of reducing carbon emissions as rapidly as possible because there is a long time lag in terms of bringing things back to normal, if you will. The proposed increases in our budget this year will continue to give us information about the extent of the problem, how uniform it is from one place to another by establishing good monitoring, and getting a much better handle on the consequences of changes in ocean chemistry to at least some of the important species.

I fully acknowledge that it is nowhere near as much as we probably need to be doing, but it builds very strongly on what we have begun and will be a very important contribution.

Mr. BAIRD. I applaud you for that effort, and I just think it is a critical, deeply troubling problem.

Part of that issue of monitoring acidity has to do with how—what kind of instruments we are able to put in the water, and I just put this out there. I am familiar with the device that is sort of a self-swimming monitoring platform that has actually succeeded in traveling from Hawaii to our coast and back and without any motors, without any external energy, just on the wave motion itself. It seems to me a pretty remarkable device. I hope NOAA will consider test piloting a mini group of those so we can see if they are viable with the instrumentation that we have seen at PNNL [Pacific Northwest National Lab] and other places.

PERMITTING AND REGULATORY ISSUES

Two other quick questions. One, we have a huge issue of permitting in our region as you know very, very well. Virtually anything we do with excel monids and other freshwater species as well. Is your budget taking into account the needs for permitting to make expeditious permitting decisions in our northwest region, because the delay in permitting costs us hundreds of millions of dollars over the course of time.

How does your budget deal with the regulatory side of NOAA's mission?

Dr. LUBCHENCO. Congressman, are you referring to permits that relate to Endangered Species Act—

Mr. BAIRD. Exactly. Right.

Dr. LUBCHENCO. —and Mammal Protection Act?

Mr. BAIRD. Right.

Dr. LUBCHENCO. The permits that we issue do inevitably take some time. That said, we are behind in issuing them in as timely a fashion as we would like, because we don't have the resources to do that, and that is very frankly an impediment.

Mr. BAIRD. So that is an area where we might want to see a budget increase, just the personnel can't handle the demand.

Thank you for your frank answer, and thanks for your service. Chairman GORDON. Dr. Broun is recognized for five minutes.

Mr. BROUN. Has Dr. Ehlers already—

Chairman GORDON. He will be—he will have his opportunity after you. You arrived first.

Mr. BROUN. Well, thank you, Mr. Chairman.

STRUCTURE OF THE NATIONAL CLIMATE SERVICE

NOAA's identified which assets would be moved in order to create the new Climate Service office. These include major parts of the Earth Systems Research Lab and the Geophysical Fluid Dynamics Lab at Princeton. But these labs are conducting major weather-related research activities. In fact, ESRL, the Earth Science Research Lab, was—the consolidation of five separate Colorado-based laboratories only five years ago.

How do you—now you are proposing to split them up again. Why is that?

Dr. LUBCHENCO. Congressman, the existing Climate Science and delivery of Climate Services is now scattered in many different places within NOAA, a number of different line offices. The ones to which you have referred are ones that are currently part of the Office of Oceanic and Atmospheric Research.

None of those offices would move physically. None of those people would move physically, but like many NOAA programs, the specific labs that are appropriate to this NOAA Climate Service would be move into that new line office, and it is because they will have—it is because we believe it is important for the climate sciences and service delivery functions to be closely affiliated with each other to continue to strengthen the science and to continue to have the services reflect the latest science.

Mr. BROUN. Well, I believe if something ain't broke, don't fix it, and I think we are fixing something that ain't broke, but—maybe it is broke but anyway. How much of ESRL's physical sciences division is climate research versus weather research?

Dr. LUBCHENCO. Congressman, I don't have that breakdown on the top of my head, but I would be happy to get it for you.

Mr. BROUN. It is my understanding 80 percent is weather. How much of ESRL's chemical science division is climate versus weather research?

Dr. LUBCHENCO. I don't know that either, sir.

Mr. BROUN. I understand one-third is weather. How much of GFDL [Geophysical Fluid Dynamics Laboratory] in Princeton is non-climate?

Dr. LUBCHENCO. I am not aware of any but—

Mr. BROUN. Well, I think about 20 percent is weather modeling. What do you plan on doing with those assets in these divisions that are not climate related but are now moved into the Climate Service? So you have got—I just gave you some data about non-weather-related issues. What are you going to do with them?

Dr. LUBCHENCO. Congressman, there is really a continuum between climate and weather, and this is part of our challenge, and we had very long discussions about the appropriate place for these entities, and I think your question is really pointing out a very fundamental reality, and that is that regardless of where any particular lab resides in NOAA's structure, it needs to be able to relate effectively and efficiently to other structures. The same is true for fisheries, for example, or for—

Mr. BROUN. Well, let me interrupt you just a minute, because I am about to run out of time. I don't think that breaking up ESRL is a good idea, particularly when it was consolidated just five years

ago, and you have got—I think your plan is flawed, and I hope you will reconsider that.

RECREATIONAL FISHING

As an individual who got involved in politics, I began my political activism because of my conservation ethics and because I am a hunter and a fisherman, and the agency Ocean Policy Taskforce is apparently talking about instituting policy that would lead to a ban of recreational angling in the United States.

And, in fact, I just got an e-mail today from a friend of mine who lives in Louisiana, very concerned about the Department's policy on this. Please give me assurances that recreational angling will certainly be considered, as well as commercial fisheries, because it is the lifeblood of a lot of coastal communities, and we can conserve our resources. We don't have to just necessarily protect those, but would you please reassure me and the angling public, whether it is commercial or recreational, that their issues are going to be taken into consideration.

Dr. LUBCHENCO. Congressman, I firmly believe that both commercial and recreational fishing are vitally important to this Nation, and part of my focus at NOAA has been doing a better job of working with both recreational and commercial fishermen because they are important, their interests are important, and I think as we move ahead with considering all of the activities that are affecting or interacting and competing for space on the water, if you will, those interests are absolutely part of NOAA's responsibility to represent.

And I have told recreational fishermen exactly that.

Mr. BROUN. Well, they are not convinced at this point and neither am I when you look at the list of organizations that are pushing for this ban that NOAA is listening to evidently very loudly. They think it is cruel and unusual treatment of a fish to hook him in the mouth with a hook. I guess that is cruel and unusual to take them home and eat them, too, which some of these critters are good to eat.

Dr. LUBCHENCO. Congressman, we are not proposing any blanket ban on recreational fishing. I would strongly oppose that, and that is not in the works.

Mr. BROUN. Well, like I say, the recreational fishermen of this country aren't convinced of that, and I think you can do a better job in convincing them that their recreation, their sport, and some of them's livelihood is not going to be threatened by your department.

Thank you so much. My time is up, and I yield back.

Dr. LUBCHENCO. Mr. Chairman, could I add one quick note?

Chairman GORDON. Sure.

Dr. LUBCHENCO. Congressman, we have convened a summit with recreational fishermen for next month, and it is explicitly with the intention of talking about these kinds of things and clearing up many of the misconceptions, but also working with them to identify solutions that will enable recreational fishing to thrive and continue.

Mr. BROUN. How about commercial fishing, though? Is that—is your guidance to ban commercial fishing?

Dr. LUBCHENCO. Not at all, sir.

Mr. BROUN. Okay. Well—

Dr. LUBCHENCO. It is also vitally important to this Nation.

Mr. BROUN. Thank you, madam.

Chairman GORDON. So, Dr. Broun, your fishing pole is safe.

And Ms. Edwards is recognized.

THE CHESAPEAKE BAY

Ms. EDWARDS. Thank you, Mr. Chairman, and since I am a fisherperson, too, I am glad to hear that.

Dr. Lubchenco, thank you very much for being here today and for your testimony. I want to just ask you a couple of questions.

One is about the work that you have been doing in pursuit of the President's Executive Order on the Chesapeake Bay, and if you could describe that, and I note in your request that you will see an increase from \$5 million to \$7.1 million for regional studies in the bay. What other studies need to be done to carry out what the President has ascribed in his Executive Order?

Dr. LUBCHENCO. Congresswoman, the interagency group that is working collectively on the Chesapeake has sort of divvied up responsibilities for different kinds of activities among the different relevant agencies. NOAA is one of those. It is not the lead agency. Our responsibilities for the Chesapeake involve a significant amount of monitoring so that we can have a better handle on water quality, of habitat restoration, and a number of other activities that are in support of the overall effort.

I believe that this is a very important collective effort. The situation has simply not gotten better through time, and it is—the Chesapeake is too important a system to not be put on a path to recovery, if you will. And we are very dedicated to fulfilling our part of the interagency responsibilities to move to a much better place for the Chesapeake.

Ms. EDWARDS. Do you see any barriers to being able to complete your work, and I speak particularly to the, you know, the challenges of getting the several jurisdictions to do what they need to do at the state level in order to proceed?

Dr. LUBCHENCO. Congresswoman, that really—it really is one of the challenges. It is the multiple jurisdictions that are responsible for different actions. For example, much of the nitrogen that is flowing into the Chesapeake comes from multiple watersheds, and there are different practices and policies in those watersheds, and having that distributed source of nitrogen addressed is inevitably very, very difficult. And that has been one of the longstanding challenges, I think everybody recognizes it. And I am hopeful that this push will begin to address it more effectively.

Ms. EDWARDS. But does that—would that impede any of the work that you are anticipating doing in this next fiscal year?

Dr. LUBCHENCO. No, Congresswoman, our work is—that work is more work that is being done by other agencies, and our responsibilities are very much on the monitoring, on the habitat restoration, and we have some magnificent habitat restoration projects in that area that are restoring coastal vegetation that is very important in helping to absorb nutrients that are coming down the streams, for example.

And so our—I am enthusiastic about our part of this program.

THE NPOESS PROGRAM AND JOINT POLAR SATELLITE
SYSTEM

Ms. EDWARDS. Thank you. I have another question that is actually related to the NPOESS Program. The budget proposes \$806 million for fiscal year 2011. I can't say that anymore. But for fiscal year 2011 out of that increase roughly \$677 million has been requested for restructuring the NPOESS Program and creating the Joint Polar Satellite System. That is almost 84 percent of the proposed increase, and I know we had testimony before this committee, there have been challenges around interagency coordination and management challenges.

And so I wonder if you could speak to that history, and give us an idea of why you need that level of increase for the Joint Polar Satellite System.

Dr. LUBCHENCO. Thank you very much for that, Congresswoman, because this is a key part of our budget request this year, and I am delighted to have a chance to speak to it briefly.

As this committee knows, because you have called for eight reports from GAO in the last nine years, that this program has been one that has suffered very, very significant challenges, and you alluded to one of the primary challenges, and that was the management structure that entailed a tri-agency mechanism for trying to do joint procurement when, in fact, the agencies are very different in size, in culture, in requirements for this program.

The Administration's proposal to restructure NPOESS tees off directly from these GAO reports as well as an independent review team that made a series of recommendations, and the restructuring entails addressing this management challenge head on by separating the procurement for the instruments and the satellites for the morning orbit. That will be done by the Department of Defense, because the morning orbit is particularly important for our military needs. NOAA and NASA will have responsibility for the afternoon orbit, which is more, much more important for our weather predictions and for climate information.

So each of us will have responsibility for procurement of the assets relevant to our orbit, but we will continue to share the parts of the program that were working well, which are the ground systems, and so this new restructuring, creating the Joint Polar Satellite System that NOAA and NASA will be responsible for. I think this is a major step forward, and it is an opportunity to put this program back on track. Because the program is so vitally important to the national interest, it is important to get it back on track.

I believe that the restructuring now has much more realistic budget estimate, which is part of what is in our request, a stronger government technical team, a procurement approach that allows early identification and restructuring of problems, and a management structure that can proactively manage.

And so I think there was broad acknowledgment that the resources in the program were insufficient to accomplish its mission, but there was very little appetite in putting more resources into a dysfunctional management structure. And now that the manage-

ment structure is, I think, in a position to succeed, the resources that are in our budget will enable that to happen.

Ms. EDWARDS. Okay. My time has long expired. Thank you, Mr. Chairman.

Dr. LUBCHENCO. Sorry. That was a long answer.

Chairman GORDON. Well, it is an important question. It is one that this committee has dealt with, and we shake our head and think about how better we could have spent that money, but we are where we are. I feel that the Administration, you know, is focused on that, and that is a good place to start.

Dr. Ehlers is recognized.

ASIAN CARP IN THE GREAT LAKES

Mr. EHLERS. Thank you, Mr. Chairman. Most of the questions I might have asked have been asked, but I raise just two minor issues which are not really questions but will certainly lead to some.

We have a major problem in the Great Lakes with the Asian carp coming up the Mississippi River, and you have heard the discussion about the private fishermen and the commercial fishermen. That is really amplified in the Great Lakes. We have something like—just in like Michigan \$7 billion a year as a result of that. In the Great Lakes system it is close to \$18 billion, and that is at stake here.

And I certainly hope that NOAA will be very active in the scientific work that is going on. I know the Army Corps is involved. They have moved at a very, very slow pace. I have been talking to them about this for over ten years. Finally now they are getting serious action.

But EPA is involved. I think, I hope that you keep a close eye on that, because I think NOAA probably has the most scientific credibility in dealing with the problem, at least most aspects of the problem. So I urge you to become actively involved, and if you—if NOAA is not totally involved by the other parties, I hope that you will volunteer their services.

Dr. LUBCHENCO. Thank you, Congressman, and I—your assessment, I think, is absolutely correct. That fishery is very, very valuable and is at great risk.

Mr. EHLERS. Yeah. I mean, it has been so frustrating to me. I always have had a long time planning horizons. I started working on this in 1995. I just could not get people excited about it.

Dr. LUBCHENCO. Uh-huh.

Mr. EHLERS. Now that the fish are almost in the lake everyone is excited, and it is—it may be too late.

A NOAA ORGANIC ACT

The other issue is something that I have also worked on a very long time, and that is a NOAA Organic Act.

Dr. LUBCHENCO. Uh-huh.

Mr. EHLERS. It passed the House several years ago, and it was too late in the year for the Senate to take it up. I was assured it would be the following year, and the politics changed, and it never has been.

Part of the problem is that we have multiple—well, you have multiple jurisdiction, two different committees. We are interested in the portion of NOAA that deals with the responsibilities of this committee, but we have not been able to get that bill through the other committee that has jurisdiction over many of your activities.

I would appreciate, and I believe the Chairman agrees with me on this, appreciate anything you can do to convince everyone necessary that you really want the NOAA Organic Act that we have prepared. It seems to me absurd that we have an agency that was created by Executive Order, what is it? Almost 40 years, 35?

Dr. LUBCHENCO. 1970.

Mr. EHLERS. Yeah. And it just doesn't make sense, and the National Science Foundation, which is another major research organization, started out with an Organic Act—

Dr. LUBCHENCO. Uh-huh.

Mr. EHLERS. —and has proved invaluable to them. So this is something that should happen.

Now, if the fish people don't like our Organic Act, that is fine. You know, there is always something fishy somewhere, but I would hope that you could do whatever you can to persuade everyone who has anything to say on this that at the very least we should pass the portion of the Organic Act that we have and recognize fully as we do that we are not impeding on the jurisdiction of the other committee, and we are not trying to change their activities.

And then if they wish to write an Organic Act for their activities, that is fine, but they have been trying to rewrite or stop our portion, which is a major part of your work.

So that is a plea for cooperation from everyone involved in the Congress and the agencies and may even go up to OMB and the President in terms of resolving this.

Dr. LUBCHENCO. Yes, Congressman, I greatly appreciate your continued interest in this. NOAA would welcome an Organic Act. I think you are absolutely correct. It is appropriate. It may be useful for you to know that we have just received a letter from the Senate Commerce Committee on this very subject, and I believe there is keen interest on their part in seeing something happen as well. So we look forward to working with you on this.

Mr. EHLERS. Well, as you probably know, my time is limited. I will be out of office at the end of the year, so I hope we can get it all done this year. Thank you.

Chairman GORDON. Dr. Ehlers, we want to let that be one more tribute to you, and we have had discussions with the Natural Resources Committee. I think there has been a legitimate good faith. Tomorrow at 1:00 the majority and minority here will be meeting with their staff, and we are going to continue to try to move this bill forward.

So hopefully we can give you a going away present.

Mr. EHLERS. Thank you, and I appreciate your constant support of this difficult issue. It is very important that you have done your work, and I very much appreciate that. Thank you.

Chairman GORDON. Ms. Dahlkemper is recognized for five minutes and then followed by—

Ms. DAHLKEMPER. Thank you, Mr. Chairman. I wanted to ask—I got to hear your answer regarding the issue with the fishing,

sports fishing, commercial fishermen. You talked about a summit. Can you tell me where that is going to be and when?

Dr. LUBCHENCO. It will be here in Washington, DC. It is early April. I could guess at the date, but I might be wrong, so I will look it up and—

Ms. DAHLKEMPER. Will there be any opportunity for Congressional input into this summit?

Dr. LUBCHENCO. I think that is an excellent idea. As far as I know that has not been built into the program, but I think it would be a useful thing for us to work with you on.

Ms. DAHLKEMPER. I would appreciate that. I reside on Lake Erie, and I am the only part of Pennsylvania that has Lake Erie. We have the smallest border of any state on the Great Lakes, but it is very important to the industry and to our economy.

And with that I will yield back. That was the only question I had. It was already answered. Thank you.

Dr. LUBCHENCO. Thank you.

Chairman GORDON. Got the job done there.

Mr. Wu is recognized.

SOME GENERAL COMMENTS

Mr. WU. Thank you very much, Mr. Chairman, and Dr. Lubchenco, I want to congratulate you on adjusting to this Washington and congratulate you also on starting some very good work, and perhaps given Dr. Broun's concerns about fish and fishing, perhaps the best way to put those concerns to rest, Dr. Lubchenco, is that you and Dr. Broun and I could go home to Oregon and do a little fishing. I understand there is a good run of salmon coming this year.

I want to pay particular homage to Mr. Baird who is retiring. I note that we have Dr. Ehlers and the Chairman, who are retiring, and so we have three right now, three excellent Members. I hope that it is not an infectious process, but I want to thank you all for tremendous leadership of this committee.

And Dr. Baird in particular, there has been no stronger advocate for the oceans and, in fact, no more passionate concern about ocean acidification. Now, it takes a special person to become passionate about ocean acidification, but it a very, very serious, very serious topic. It is not just the reefs and all the biodiversity that is on those reefs which is at threat, but the very basis of the food chain in our oceans is at threat because so much of planktonic life has a carbon—I mean, sorry, a sulken shell, which—and I am sorry. I am getting close enough. Calcium.

Dr. LUBCHENCO. Calcium carbonate.

Mr. WU. Calcium carbonate. It has been a long time since college, and Brian, you have been a good neighbor, a good fellow, Member of this Committee, and I think that what you have done to put ocean acidification on the issue map is a strong sign to all that one person can make a difference, and we will miss you on this committee and miss you in this Congress, as we shall miss Dr. Ehlers and the Chairman.

Dr. Lubchenco, I would like to ask—

Mr. EHLERS. Will the gentleman yield?

Mr. WU. Absolutely if the Chairman will make it up to me since I have——

Mr. EHLERS. Yeah. This will be very brief. I just want to thank you for your comments but also add to your comments about Dr. Baird. I have worked with him on a different subcommittee last time, and he has been an outstanding person to work with, and what I particularly appreciated is with his social science background he brought a unique perspective to this and made the whole Committee aware of the importance of the social science as a science in dealing with all the issues we deal with. And that I think has been a major contribution.

So from that standpoint this committee loses much more with you than with me, because I am just a state physicist. You are talking about passion. I am Dutch and physicist. I don't even know what passion is.

Thank you.

THE RELOCATION OF NOAA'S PACIFIC OPERATIONS

Mr. WU. Thank you very much, Dr. Ehlers, and I also want to add that you were a terrific Chairman of the Subcommittee when I was the Ranking, and we worked together well when I was the Chairman and you were the Ranking, and I think that is the way that committees ought to work, and that is a good form of non-partisanship.

Dr. Lubchenco, first of all, I want to applaud you for a notice decision last August to relocate the Pacific fleet to Newport, Oregon. This decision I believe reflects NOAA careful and balanced consideration of the relevant facts as well as Newport's ability to provide the most functional location for NOAA's Pacific operations for the lowest cost to taxpayers.

It is further my understanding that Newport demonstrated the strongest capacity among all applicants to meet NOAA's needs, and I would like you to please speak to the process that NOAA undertook in considering potential sites for the NOAA fleet and specifically how bids were solicited, what qualities NOAA was looking for when searching for its new home in the Pacific Northwest, and what specific factors led NOAA to the conclusion that Newport offered the fleet the most functional location at greatest value to taxpayers.

Dr. LUBCHENCO. Congressman, thank you. It is nice to see you again. The process that NOAA followed follows the guidelines set out by GAO and entailed a description of the different requirements for the facility, both in terms of the ability to house up to four vessels at one time and the ability to have located adjacent to that the people that need to be in close proximity to the vessels.

We laid out a series of technical requirements, had an open-bid process, and reviewed all of those proposals based on their technical merits, the extent to which they met the technical requirements that had been articulated, and then rated them on the value proposition, with the intent of finding the best deal for the American taxpayer essentially. And I was not part of the process when it was set up. I was not part of the process as it played out. I came in sort of at the tail end of this process, and the decision that was made reflected the fact that the Newport offer was the highest

technically rated and for the least cost. So that was pretty much in a nutshell the basis of the decision.

Mr. WU. Well, Dr. Lubchenco, you know, I note that you were last at Oregon State, but there is no question about geographic origin here, because I note that you taught at Oregon State, the Secretary is—was governor of Washington State, so one assumes that there is reasonable balance and that this is a decision on the merits and will remain so.

Mr. Chairman, will there be another round of questions?

Chairman GORDON. That is up to Dr. Ehlers.

So why don't we—certainly if you have some more questions, why don't we go to the return of Mr. Rohrabacher, and we will then—anyone that has anything else, we will—we want to be courteous to Dr. Lubchenco, but then we will move forward.

SATELLITE AND SPACE TRANSPORTATION CAPACITIES

Mr. ROHRABACHER. Thank you. You know, this is an issue that actually has been around for awhile, and but it ties directly to something the Administration has done in another area of science. The Administration seems to be deciding that it is going to permit us to be dependent upon private sector space transportation systems in the future, and they just, of course, zeroed out the request for the Aries rocket and the Constellation Program.

I seem to be the only one on this committee that has had a positive reaction to that, but it leads me to ask a question of NOAA. Years ago I remember there were similar proposals that the NOAA fleet actually, like you would say, the NASA fleet of rockets is not necessary because you could actually contract out to the private sector at a lower cost.

Has that been looked at at all as an alternative?

Dr. LUBCHENCO. Congressman, I believe that when NOAA formulated its Fleet Recapitalization plan a number of years ago, well, before I was affiliated with NOAA, that there were—that that alternative was taken into account. I think it is the case that we currently do utilize some private, especially fishing vessels—

Mr. ROHRABACHER. Uh-huh.

Dr. LUBCHENCO. —for a number of important platforms. We do a lot of cooperative research with them, but even for other kinds of sensing we utilize them. But the ships that we have have very unique capabilities or need to be able to deliver—be platforms for unique things that cannot be easily done on a commercial fishing vessel for example.

Mr. ROHRABACHER. Uh-huh.

Dr. LUBCHENCO. On the other hand, for many of the hydrographic surveys we currently do utilize private vessels for a number of those. I don't have the breakdown. It is a combination.

Mr. ROHRABACHER. Well, you might take a look. If they are trying to make every penny count, which we have to do these days—otherwise we won't have enough money to bailout Wall Street and give big bankers money after they have given themselves billions of dollars of bonuses over the years, so now we have to cut back on NOAA or NASA or whatever.

Well, anyway, that is a whole other issue, not concerning you, but if we can save taxpayers some money by contracting out, just

like, for example, in NASA relying on private rocket companies rather than having NASA do something at a much greater expense, that may make some sense.

THE SCIENCE OF CLIMATE CHANGE

Let me get—I have an article here talking about how the cold weather is killing huge areas of the coral down in Florida, and let me just note that I thought it was global warming that was causing all of this trouble with the ocean. Some people tell me that there hasn't been any significant warming for 15 years, and other people say, no, no. The manmade global warming, it is still on the way.

Has there been warming in the last let us say five to 10 years?

Dr. LUBCHENCO. Congressman, we just completed the warmest decade on record.

Mr. ROHRBACHER. That is odd, because just, I mean—for someone to say that as we have just passed through the coldest time period in California that I can remember, I mean, I don't, I honestly don't remember a colder time period in California. I think that across this country there is very few people that can remember a colder time period than these last few years.

So how is it that we have—we completed the hottest decade, or does that mean that we completed a decade in which there was a high year and that was the highest year there was in a number of years? Or was it a temperature or that the temperatures all were up?

Dr. LUBCHENCO. Congressman, there is a long-term warming trend that is underway and for which there is very good evidence.

Mr. ROHRBACHER. Uh-huh.

Dr. LUBCHENCO. And there is year-to-year variability in that that is short-term climate variation, and this year, for example, if we just highlight this year, there are two phenomena that are known to vary from year to year. One is El Nino, and one is something called the Arctic Oscillation, and those two, again, vary from year to year, and are sort of superimposed upon the long-term warming of the planet that is underway.

Mr. ROHRBACHER. My time is just up now, but let me just note. This debate could go on a long time because I obviously disagree with that—with some of your premises there, but let me just note there are—and I would submit for the record at this moment the names of 100 major prominent scientists, some of them heads of major science departments at universities throughout the country, who disagree with that assessment about the long-term global warming.

Thank you very much, Mr. Chairman.

[The information follows:]

List of 100 scientists who agree that:

- The case for alarm regarding climate change is grossly overstated;
- Surface temperature changes over the past century have been episodic and modest;
- There has been no net global warming for over a decade;
- The computer models forecasting rapid temperature change abjectly fail to explain recent climate behavior; and
- Characterization of the scientific facts regarding climate change and the degree of certainty informing the scientific debate is simply incorrect.

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Chairman GORDON. Dr. Baird is recognized.
Mr. BAIRD. I actually want to clarify for my good friend from California that it is not anthropogenic CO₂ that caused the apparent cooling of California. It is Mr. Rohrabacher himself. The reason for that is it would be a cold day in hell when Dana Rohrabacher quoted the Russian Academy of Scientists, and hence we have ascertained the cause of the apparently cold snap in California.

I want to, on a more serious note, thank my dear friend, Mr. Wu, and neighbor to the south for his kind comments and Dr. Ehlers as well. The feelings are mutual on both sides. We will have time to get even more maudlin as the year goes on, but I am grateful for your kind words and for the privilege of serving with you.

THE NOAA AQUARIUS LAB AND HARMFUL ALGAL BLOOMS

Two quick things. One, I just want to put a quick marker down. As you know, I am—I have been to the Aquarius Lab. I just think it is a treasure, and I hope it is well funded in the budget. I haven't seen that line item. Maybe you can address that very, very briefly, but I think they do remarkable work there, not only for science itself, NOAA's science mission, but also as a platform for training for NASA astronauts, Navy SEALs, and others. And I know they have been through a rough spell lately, but I am a big believer in Aquarius.

Finally, we unfortunately failed to pass under suspension yesterday a bill that I authored on the harmful algal blooms and hypoxia, and I wonder if you could just briefly talk about as a scientist about those issues, you know, in a one-minute summary of why harmful algal blooms and hypoxia matter.

Dr. LUBCHENCO. Congressman, the Aquarius Laboratory is an important asset, and as you know, we are nearing the end of a review of our entire diving program with the idea of making sure that it is as safe as possible for everyone involved, and there will be recommendations coming from that. There are not significant increases that are proposed for that program. We are sort of waiting to see exactly how the recommendations are going to play out, and then we will be implementing them.

Mr. BAIRD. If I may, but there is no plan, so zero funding out? You are at least holding it even I trust?

Dr. LUBCHENCO. That is my understanding.

Mr. BAIRD. Okay. Thank you.

Dr. LUBCHENCO. Harmful algal blooms are not unheard of—let me start that over. Harmful algal blooms are outbreaks, an explosion in growth of some microscopic plants typically, and they are increasing in frequency and severity and duration, and many of them result in the production of toxins that can be—that can kill fish or produce threats to human health. Many of them also result in using up—when the microscopic plants begin to decay, the bacteria that are decomposing then use up all the oxygen in the water, and that creates a dead zone as an area of insufficient oxygen for most animals.

And so you can also get fish kills because there is not enough oxygen or because there is a toxin. Both are very, very important. Many of them are—many of these harmful algal blooms are increasing because of runoff of nutrients from the land, and they are a very serious threat to many fisheries and to tourism, to many coastal—to the health of many coastal communities, and our activities, thanks to the interest of you and others, have been increasing over the years, but they are not at the scale that they could or should be.

Mr. BAIRD. I appreciate that. I just for the record observe that some of my colleagues today who have expressed great concern for

hunting and fishing did not support this legislation, and I would say from those who care about the health of marine systems, both freshwater and salt water, species are greatly endangered by both harmful algal blooms and hypoxia, and I would hope as is, as you mentioned, tourism, especially on the Florida and Gulf Coast and my own coast is affected.

So I appreciate your insights into that, and thank the Chair for a second round.

Chairman GORDON. Yes, sir, Dr. Baird, and with no objection Mr. Rohrabacher's list will be resubmitted for the record.

And Mr. Hall is recognized.

Mr. HALL. I just came back to get some things I left. I thought you would surely be through by now. This good lady straightened me out, and I left.

And on the algal, harmful algal blooms, the only thing that worries me, it is a good program. I support that program, but the amounts kind of startled us a little bit. The last authorization I think was 26 million. The last appropriation was 15 million, and the President's budget was 15 million. This one was 41 million. I just thought it was too much money, but I will take another look at it.

I am not sure. I don't know what has been asked. I will yield back my time.

Chairman GORDON. Dr. Wu, I think you said you wanted to—Mr. Wu wanted to have a final word.

Mr. WU. My father always wanted me to be a doctor, Mr. Chairman, so maybe that will fix things.

You know, Mr. Baird is always a pleasant surprise. I mean, I am finally catching up to him on ocean acidification and now he has moved onto hypoxia and eutrophication. So it is a constantly moving target.

MORE ON THE NPOESS PROGRAM

Dr. Lubchenco, I spent some time focusing on NPOESS first when I was the Ranking Member with Dr. Ehlers as Chair and then later when I was Chair of the Subcommittee which then had jurisdiction over NOAA and the NPOESS Program, and I would have to say that it has been a long and somewhat tortured program. And I understand that after much consideration there is a decision to split the program into a DOD and a NOAA component.

And the original program came because two Administrations ago the decision was made that there were gains to be made by joining the DOD and NOAA Programs, the Civilian and Military Programs, and now that many of the very difficult instruments have actually been developed and a bus has been developed, now we have a split of the program after \$5.6 billion has been spent on it.

And Dr. Lubchenco, this is my concern. I understand that, you know, these decisions are made somewhere else in the Executive Branch, but I got to say that I am deeply concerned that the decision to split looks great right now, but, you know, satellite programs don't come in on cost, and we have these instruments that are developed, a bus that has been developed. In essence, a lot of the risk is behind us and now we have at least one nascent pro-

gram over at DOD, and I understand that the NOAA Satellite Program is like a rounding error on the DOD Satellite Program.

I am deeply concerned that three years from now, four years from now, five years from now just as I expressed to Administrator Bolden about what his Privatization Program would do to costs on the NASA side, I am deeply concerned that the DOD Program, which is not under this committee's jurisdiction, will balloon in cost, and we will repeat the NPOESS experience, except now we will have two programs. I assume that the NOAA Program will continue in roughly its form, and a lot of the risk is behind us, but as an Administration matter I am concerned that some other committee has—Armed Services will have to deal with those cost overruns on the NPOESS Program. And it seems irresponsible to me to go down that path and throw away a significant part of the \$5.6 billion which has already been invested.

And I would like you to—I would invite you to address that concern.

Dr. LUBCHENCO. Uh-huh.

Mr. WU. Is every satellite program to run over budget? Is it the nature of pushing the frontiers, is it the nature of pushing technology?

Dr. LUBCHENCO. Congressman, I believe that the Administration's decision to restructure the NPOESS Program reflects many of the recommendations that have been made by the GAO reports over the last nine years, as well as the Independent Review Team's assessment, all of which noted that since its inception in 1994, the NPOESS Program increased in cost 87 percent, while delaying—

Mr. WU. Is that in line—

Dr. LUBCHENCO. —a launch—

Mr. WU. —with other satellite programs?

Dr. LUBCHENCO. It is—no, not in NOAA's experience. In NOAA's experience—

Mr. WU. What about in DOD's experience?

Dr. LUBCHENCO. I can't speak to that but—

Mr. WU. Can you get that information?

Dr. LUBCHENCO. I can certainly get that information.

Mr. WU. Thank you.

Dr. LUBCHENCO. One thing that I think bears pointing out is that NOAA and NASA have jointly operated a number of satellite systems, and those, in fact, have been very successful, and they have overseen the procurement, the development, the procurement, the launch, and the operation of those systems. And so we do have good experience in doing just that.

The satellite system, the NPOESS Satellite System, the proposal of the Administration is to separate the procurement parts of the responsibilities but to continue to share the parts of the program that are working well, which is the ground-based systems. And so recognizing that the Department of Defense's primary interest is in the morning orbit, they would have responsibility for that morning orbit. The instruments and the satellite system, and NOAA's responsibility with NASA in assistance would be for the afternoon orbit, which is appropriate for our weather and satellite information.

And so the fundamental management problem that was driving much of the cost overruns and repeated delays and loss of capacity was the challenge of making joint procurement decisions with agencies that have widely-differing budgets, sizes, cultures, decision-making processes, and completely different requirements. And so I believe that the Administration decision has taken heed of all the problems and has identified a path to success for this program. I am very enthusiastic about where we are now and believe that this will put us back on track. I think the program was an embarrassment, and I think that we now have a mechanism to be able to ensure the continuity of climate and weather data from space that is so vital to the Nation.

Mr. WU. Well, a concern is that the program had become somewhat embarrassing at \$13 billion, but I think the question is whether we will be further embarrassed at two programs, whether they will cost more than \$13 billion combined, and I think that this committee will observe with great interest NOAA's part of that expense, and as Members of Congress we will generally observe with great interest how DOD does with the other part, with the morning orbit satellite.

FISHING CATCH SHARES

Mr. Chairman, if there are not other questioners, I would like to ask one more question about catch shares.

Chairman GORDON. Well, Ms. or Dr. Lubchenco has been very generous with her time today, but, yes, if you have another quick one we can go forward.

Mr. WU. You bet. You bet. Dr. Lubchenco, I think that good science makes for good decision making, and especially in the contentious area like fisheries. Good science and good data are truly, truly important, and important data for things like stock assessments is absolutely crucial and fishery-dependent data like catch accounting. And it is my belief that catch shares properly implemented can actually improve science because they allow folks to get better fisheries-dependent information, and it is in that spirit, Dr. Lubchenco, that I want to ask you, what plans does NOAA have to ensure the best scientific management of the Pacific Groundfish Fishery? And how do you plan on working with the fishing industry to ensure that fishing opportunities are maximized while also allowing depleted fish stocks to recover in appropriate ways?

Dr. LUBCHENCO. Congressman, as you know, the Groundfish Fishery is being considered by the Pacific Fishery Management Council for our Catch Share Program, and there are very active discussions underway about the appropriate design for that program, and a design that is both durable as well as attendant to the various needs of different types of fishermen in that fishery. The design is being done based on good scientific information, and I think you are absolutely correct that the observer programs and monitoring that are affiliated with that program will continue to give us better and better information about the state of the fishery.

It is a fishery that was significantly depleted, and this proposal I think is a very encouraging one, and NOAA looks forward to receiving from the council the proposals that—we look forward to working with them on that.

Mr. WU. Thank you very much, Dr. Lubchenco, for that response, and I just want to, again, invite Dr. Broun, who is concerned about the future of fishing, to look at what you all are doing in the catch shares. It wouldn't make sense to do catch shares unless we were going to continue to fish in one way or another.

And, Mr. Chairman, thank you very much for granting us this additional opportunity to ask questions.

CLOSING

Chairman GORDON. Dr. Lubchenco, thank you for your time and patience today. We have a lot of common interests, and I am sure we will continue to work together in good harmony.

The record will remain open for two weeks for additional statements from members and for answers to any follow-up questions the Committee may ask of the witnesses. The witness is excused, and the hearing is adjourned.

[Whereupon, at 4:32 p.m., the Committee was adjourned.]

Appendix:

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. Paul Anastas, Assistant Administrator, Office of Research and Development (ORD), U.S. Environmental Protection Agency

Questions submitted by Chairman Bart Gordon

Q1. Under the overall Science and Technology Programs, the Climate Protection Program has a nearly \$3 million decrease in the FY 11 budget. A sizeable amount of this decrease pertains to S&T activities for ENERGY STAR. However, there is a budget increase for the Climate Protection Program under the Environmental Programs and Management Office. There seems to be a shift in the Climate Protection Program priorities.

a. What is the justification for not seeking additional funds for the Climate Protection Program under Science and Technology activities, especially if its intended goal is to reduce greenhouse gas intensity in vehicles? Is research in this program still a priority?

A1a. Climate Protection Program activities are an important component of what the agency is doing to meet our goal of addressing global climate change. The reduction in the Science and Technology (S&T) Account consists of a \$1 million reduction to the ENERGY STAR program. This program is primarily funded through the Environmental Programs and Management (EPM) appropriation; in FY 2010, we requested a reprogramming to allow S&T funds to be used to support the ENERGY STAR MOU with DOE. In FY 2011, that work will be funded from the EPM appropriation with the rest of the ENERGY STAR program. The remaining reduction will affect National Vehicle and Fuels Emissions Laboratory's technology demonstration projects with the California South Coast Air Quality Management District, the California Air Resources Board, and the California Energy Commission.

b. While funding decreased for ENERGY STAR S&T activities, ENERGY STAR funding levels grew in Environmental Programs and Management. Will the expansion of ENERGY STAR within EPM be sufficiently supported by complementary research components?

A1b. Increased funding is requested for the ENERGY STAR program to support the ENERGY STAR program across the residential, commercial, and industrial sectors. Key investments in EPA's energy efficiency programs will expand their reach and make an important contribution to advancing the Administration's climate change objectives.

Some technical support for the ENERGY STAR program comes from the Department of Energy (DOE), which works with EPA to develop testing standards for evaluating the energy efficiency of product categories covered by the program. Separately, the Global Change Research program, run by the Office of Research and Development, does not directly support the ENERGY STAR program. EPA's Global Change research program is focused on understanding and assessing the effects of global change—particularly climate variability and change—on air quality, water quality, aquatic ecosystems, human health and social well being in the United States and supports the Administrator's priorities for taking action on climate change, improving air quality and protecting America's waters.

c. What science and technology research has been or will be done that will underpin the goals of the ENERGY STAR program?

A1c. As noted above, technical support for the ENERGY STAR program occurs at both EPA and DOE. DOE works with EPA to develop product testing and verification procedures for evaluating the energy efficiency of products that earn the ENERGY STAR. EPA oversees all ENERGY STAR requirements and manages the ENERGY STAR brand (including product verification and enforcement against logo violations). EPA's climate protection partnership programs promote successful strategies and practical solutions to help Americans reduce energy use, save money and protect the environment. These programs have produced sizeable benefits since 1992 throughout the commercial, industrial and residential sectors due to the efforts of thousands of committed partners.

Questions submitted by Representative Marcia L. Fudge

Q1. I am pleased to see that the Office of Research and Development request for endocrine disrupting chemicals research is at \$17 million, showing a 54 percent increase. This is especially important to my district, which borders Lake Erie.

Fish in the Great Lakes are known to be contaminated with polychlorinated biphenyls, or PCBs, as well as other man-made chemicals. This contamination has caused fish to experience numerous reproductive problems, as well as abnormal swelling of the thyroid glands. It is also known that during embryonic development, all vertebrates are fundamentally similar and it is safe to assume that humans also experience reproductive and developmental problems from this contamination.

- a. *What will the Office of Research and Development do to leverage the funding provided for endocrine disrupting chemicals research to improve the water quality in the Great Lakes?*
- b. *More specifically, how will transition from not just researching the problem, but fixing the problem?*

A1. The increased resources for EDC research will enable EPA to apply the latest state-of-the-art technologies and innovations to advance the assessment and management of chemicals with potential endocrine disrupting effects and other emerging contaminants of concern to better protect human health and wildlife. Of particular relevance to the Great Lakes (GL), methods have been developed to assess the effect of chemicals on the estrogen, androgen, and thyroid pathways using fish and amphibian species. ORD scientists have been in discussions with Great Lakes National Program Office (GLNPO) staff regarding these chemicals of concern to EPA. In general, these chemicals are predicted to be or known to be present in the Great Lakes environment, but whose toxicological properties are insufficiently understood to allow for scientifically sound risk assessment. EPA recognizes that the tools developed by ORD could be used to address some of the uncertainties associated with chemical contaminants in the Great Lakes. For example, EPA's Office of Water is applying results of ORD's research to evaluate the impacts of emerging contaminants and develop mitigation measures to impacted waterbodies such as the Great Lakes.

For example, ORD has developed assays for the Agency's Endocrine Disruptor Screening Program (EDSP) as mandated in the Food Quality Protection Act. Of particular relevance to the Great Lakes (GL), methods have been developed to assess the effect of chemicals on the estrogen, androgen, and thyroid pathways using fish and amphibian species. Although these methods were originally developed to meet the needs of the EDSP, they are also amenable to being used to evaluate environmental samples.

In addition, as a direct result of the above activities is a new collaboration with USFWS which utilizes ORD's expertise in EDCs to augment field studies that USFWS is undertaking with Great Lakes Restoration Initiative (GLRI) funding. Specifically, ORD will employ a small fish model developed under the EDRP to evaluate effects of chemicals in the GL on estrogen and androgen pathways in fish. In addition, a partnership between EPA Region V GLNPO and ORD, under the GLRI, is planned to enhance and exploit ORD's ability to apply their expertise to further assess the estrogen, androgen, and thyroid pathway effects of chemicals in the GL environment.

Furthermore, ORD pursues solutions to the problems of PCBs and other anthropogenic contaminants in sediments under both the EDRP and the Land Research Program's Contaminated Sediments Research Program. Through the latter program, three aspects of risk management have been emphasized: predicting the effectiveness of dredging, understanding mechanisms affecting monitored natural recovery, and evaluating active cleanup options. The dredging research focuses on the concern that post-dredging residual volumes and contaminant concentrations are still high enough to harm ecological receptors directly and humans indirectly via fish ingestion. Locations for this field research include: Ashtabula River, Ashtabula, Ohio, and Ottawa River, Toledo, Ohio. Research on monitored natural recovery (MNR) is directed at understanding the mechanisms (principally natural capping) and rates of reducing contaminant exposures. Field research on MNR occurred at Lake Hartwell, South Carolina. Active cleanup options focus on innovative capping technologies and improved methods for management of PCBs and other priority pollutants. This research considers chemical concentrations, biological effects, and contaminant flux when appropriate. Where possible, this research has partnered with other groups such as the GLNPO, academics, and the Army Corps of Engineers.

Questions submitted by Representative Ralph M. Hall

- Q1. *On May 21st, 2009, the Administrator issued a memo outlining the new process for setting National Ambient Air Quality Standards (NAAQS). Her memo outlined five major elements of the process: Planning, Integrated Science Assess-*

ment, Risk and Exposure Assessment, Policy Assessment, and Rulemaking. This is a heavily involved process and takes a period of years. The current criteria pollutants affect many areas of the country, while their impacts at the regional and local levels. EPA chose not to follow a similar comprehensive process when making a determination on carbon dioxide, a pollutant it claims has global public health and welfare consequences. Why was a similar rigorous process not instituted for the endangerment finding even if not delineated by any statute?

A1. In response to the Supreme Court's decision in *Massachusetts v. EPA*, EPA has been examining the scientific and technical basis for the *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act* (herein referred to as the Findings) since 2007. EPA followed a rigorous, methodical, and transparent process to develop the Technical Support Document (TSD) accompanying the Findings, which summarizes the soundest available science reflecting the peer-reviewed and fully vetted scientific literature on greenhouse gases, climate change, vulnerabilities, and potential impacts. Beginning in 2007 when EPA initiated work on the TSD and twice in 2009, the TSD underwent three rounds of technical review by 12 Federal experts from USGS, NOAA, DOE, USDA, NASA, HHS/CDC, EPA, and OSTP. It also went through three rounds of internal EPA review, and two rounds of public comment. Thus, while the process followed for issuing the endangerment finding was different than the NAAQS process (some specific elements of which are required by statute); it was a robust and transparent process that met the Agency's standards of rigorous scientific review.

Q2. *There have been several suggestions that the decision on the endangerment finding was predetermined. In fact, during his campaign, President Obama pledged to classify carbon dioxide as a dangerous pollutant that can be regulated if he won the election. This statement seems to imply that regardless of what the scientific evidence held, President Obama had already made up his mind and claimed his Administration would proceed on this track. How does this position adhere to the President's stated intent to make policy decisions based on sound science through transparent processes and upholding the basic tenets of scientific integrity? How does this position adhere to your stated intent during the hearing that any kind of political interference with science is antithetical to scientific integrity?*

A2. The process of developing the Findings began in 2007 under the previous Administration as a result of the Supreme Court's decision in *Massachusetts v. EPA*. The Administrator's determinations relied solely on a careful consideration of the full weight of scientific evidence and a thorough review of hundreds of thousands of public comments. To the extent some people believe the May 2009 announcement regarding motor vehicles was evidence that the endangerment finding was preordained, they are mistaken. The final Findings discuss the fact that the Administrator's decision was not preordained, explaining that the endangerment provisions would have to be satisfied in order for EPA to finalize emission standards for motor vehicles under 202(a). (see Federal Register Notice Volume 74 No. 239 pg 66502). This explanation is consistent with statements made in the EPA and Department of Transportation's Notice of Upcoming Joint Rulemaking to Establish Vehicle GHG Emissions and CAFE Standards (May, 2009) and EPA's proposed greenhouse gas emissions standards for light duty motor vehicles (September, 2009). Nothing was preordained and EPA made it very clear that the full process for endangerment and cause or contribute would have to be completed before finalizing emission standards under 202(a) of the CAA. The Endangerment and Cause or Contribute Findings upheld the highest level of scientific integrity and transparency.

Q3. *The Technical Support Document for the endangerment finding uses data for U.S. and global greenhouse gas emissions and concentrations based on reporting requirement procedures set out by the United Nations Framework Convention on Climate Change (UNFCCC). In the last few months, DOE, NASA and NOAA put together an interagency group to establish a Greenhouse Gas Information System. According to this interagency group, anthropogenic carbon dioxide emissions are approximately 5% of natural surface source/sink fluxes. They estimate that current source-sink uncertainties are 50 to 80 times larger than required for treaty verification, such as those set out by the UNFCCC. This substantial margin of error suggests that we know less about our actual emissions and sinks than has been previously suggested.*

a. *How would you compare the use of data that have substantial uncertainties with the requirement of high quality data for other air emissions in setting standards?*

A3a. First, to be clear, the observed increase in atmospheric concentrations of carbon dioxide and other greenhouse gases, such as methane, is primarily driven by anthropogenic emissions of these gases. Atmospheric concentrations of carbon dioxide and methane now appear to be at their highest levels compared to, at least, the past 650,000 years. While there are significant uncertainties related to our understanding of the carbon cycle in its entirety, the bulk of this uncertainty is related to the nonanthropogenic component (e.g., ocean-atmosphere exchange). Both the endangerment finding and the UNFCCC address anthropogenic sources and sinks, which can be quantified according to well-established inventory methodologies. For fossil-fuel combustion, which is the largest source of anthropogenic emissions in many countries, tracking anthropogenic emissions is a straight-forward process involving energy consumption data and the intrinsic and well-characterized properties of different fuels. The quality of greenhouse gas emissions data is comparable to the quality of data on other air emissions.

b. *Will the setting of standards for greenhouse gas emissions not require the same quality of data as is required for criteria pollutants?*

A3b. Setting standards for greenhouse gas emissions in the U.S. requires high quality data. At the national level, the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* provides a high quality peer reviewed data set for the contributions of various source categories and economic sectors to anthropogenic greenhouse gas emissions.¹ At the facility level, EPA already receives high quality carbon dioxide emissions data measured hourly from facilities in the Acid Rain Program, which in total represent over one-third of annual anthropogenic greenhouse gas emissions. In addition, as part of the recently finalized Mandatory Reporting Rule (MRR) for greenhouse gases, EPA will receive high quality facility-level data from other stationary sources across the economy.² The MRR covers approximately 10,000 facilities across the country emitting over 25,000 metric tons of carbon dioxide equivalent or approximately 80–85% of national greenhouse gas emissions. The first facility-level emission reports are due March 31, 2011.

c. *If they do not, does this mean that EPA does not consider greenhouse gas emissions to be as much of an endangerment to the public health and welfare as the criteria pollutants?*

A3c. Within the Administrator's Findings there was no formal or quantitative comparison between the extent to which the six greenhouse gases endanger public health and welfare and the extent to which criteria air pollutants endanger public health and welfare. Such a comparison is not part of the Administrator's endangerment test for greenhouse gases under Section 202(a) of the Act.

d. *If EPA does consider greenhouse gas emissions to be at least as much of a danger to public health and welfare as the criteria pollutants, why did EPA not apply the same rigorous requirements for this determination as is used to revise standards for criteria pollutants?*

A3d. Please see our response to Question 1 and Question 3C.

Q4. *In a March 8th speech at the National Press Club, Administrator Jackson commented that: "This is what smart environmental protection does. It creates a need—in other words, a market for clean technology—and then drives innovation and invention—in other words, new products for that market."*

a. *If the government is the one to establish the market and make decisions about which products meet this criteria, doesn't this result in the Federal Government picking winners and losers based on its own ever-changing agenda?*

b. *If the regulations are put in place by an agency, rather than by Congress, couldn't they be overturned easily by the next Administration?*

c. *How can companies rely on such regulations?*

A4. Question (a) asks whether the government should be the entity that establishes markets for clean technology. Public health and welfare are harmed by pollution. For example, our nation's air is a common property resource used by all and which the government is responsible to protect. When the government limits pollution under environmental laws, those policies create markets for cleaner technologies; however, creating the demand for pollution reduction does not require the government to pick which particular technologies are needed to comply with such regula-

¹ <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>

² PART 98—MANDATORY GREENHOUSE GAS REPORTING. <http://www.epa.gov/climatechange/emissions/downloads09/GHG-MRR-FinalRule.pdf>

tions. In fact, some of the most important and innovative approaches to regulation intentionally avoid having the government pick winners and losers.

The hypothetical alternative would be for the government *not* to address harmful emissions, which is inconsistent with the laws passed. In that case, pollution could be emitted freely—even though those emissions damage public health, natural resources, and ecosystems. These costs of uncontrolled emissions would not be reflected in the market price of goods and services produced by the emitting company. Economists cite this as a classic example of a “market failure,” and this is the justification for environmental policy-making by government.

Air programs have used a variety of approaches to reduce pollution and create demand for cleaner technologies, without mandating a particular technology. For example, rules can set an overall emissions budget and allow facilities to comply either by reducing emissions, by buying emissions allowances, or a combination of the two. Examples of this include the Acid Rain Program, the NOx Budget Trading Program to reduce interstate ozone pollution, and the market-based system for phasing out certain ozone-depleting substances under the Montreal Protocol. Another option is performance standards that set numerical emission limits which allow any existing or new technology that performs cleanly enough to be used for compliance. Additional compliance flexibility for companies can be provided by coupling a performance standard with the opportunity to average, bank or trade emissions credits among different pieces of equipment or among vehicles. Performance standards with averaging, trading and banking have been routinely used in EPA’s motor vehicle regulations for more than 20 years. In a non-regulatory context, EPA’s ENERGY STAR programs has used voluntary performance requirements and labels since 1992 to advance the adoption of energy efficiency by providing homeowners, consumers, and businesses with trusted, unbiased information on reliable, cost-effective, efficient products, services, and practices that reduce greenhouse gas emissions while saving money.

The nation has seen remarkable progress in the development of cleaner technologies to meet our nation’s environmental policy requirements. There are numerous examples of low-emission technologies developed and/or commercialized over the past 15 or 20 years, such as:

- Selective catalytic reduction (SCR) and ultra-low-NOx burners to reduce NOx
- Scrubbers which achieve 95% and even greater SO₂ control on boilers
- Sophisticated new valve seals and leak detection equipment for refineries and chemical plants
- Low- or zero-VOC paints, consumer products and cleaning processes
- Chlorofluorocarbon (CFC) free air conditioners, refrigerators, and solvents
- Water and powder-based coatings to replace petroleum-based formulations
- Vehicles far cleaner than believed possible in the late 1980s due to improvements in evaporative controls, catalyst design and fuel control systems for light-duty vehicles; and treatment devices and retrofit technologies for heavy-duty engines
- Idle-reduction technologies for engines, including truck stop electrification
- Clean fuels

These technologies were not commercially available two decades ago; some were not even in existence. Yet today, all of these technologies are on the market, and many are widely employed. Studies have found that the costs of some EPA air pollution programs and regulations have been lower than originally estimated, and this may have been due, in part, to our inadequate ability to predict and account for future technological innovation and our use of flexible regulatory structures that utilize market-based incentives. (For example, see Harrington, W., R.D. Morgenstern, and P. Nelson. 2000. “On the Accuracy of Regulatory Cost Estimates.” *Journal of Policy Analysis and Management* 19(2):297–322. Additional studies are cited by Harrington. Note that this study also identified that benefits of programs and regulations have also been lower than originally estimated.)

Question (b) implies that there is a choice: Either issue regulations under current law or wait for Congress to pass a new climate law (which itself would require implementing regulations by the executive branch). In reality, executive branch agencies such as EPA have a legal duty to make determinations and issue regulations that are mandated by current law. The Clean Air Act Amendments were overwhelmingly passed by Congress and signed into law by President Bush in 1990, and the Supreme Court in 2007 decided that greenhouse gases are air pollutants as defined by the Clean Air Act. The executive branch must faithfully execute the laws enacted by Congress as interpreted by the courts. Administrator Jackson has testi-

fied that implementing current law and supporting legislation are not mutually exclusive; she strongly supports new energy and climate legislation and also is making decisions as required by current law.

Regarding questions (b) and (c), Administrator Jackson has stated that in carrying out the law consistent with the Supreme Court decision, EPA will address greenhouse gases to protect public health and welfare in ways that are sensible and effective, focus on the largest emitters, encourage clean technologies and strengthen the economy.

Q5. In the March 8th speech at the National Press Club, Administrator Jackson stated that, "many still claim that regulation is too costly, and believe that scaling back is the best thing for growth. We've also already seen that in action. The theory that less regulation ought to be good for the economy was put to the test in the last administration." The obvious reverse sentiment to this statement is that more regulation is not bad for the economy. However, many of the economic crises that occurred during the Carter Administration were a result of over regulation. Do you think this reverse sentiment is true, that more regulation will not harm the economy?

A5. First and foremost, environmental regulations have improved and will continue to improve the health and welfare of the American people, prolonging life and greatly reducing the adverse impacts of environmental degradation. From 1970 to 2007, air regulations reduced emissions of the six principal criteria pollutants while U.S. gross domestic product increased by over 200 percent. The most recent regulations (since 2000), including diesel regulations controlling emissions from heavy duty trucks and other engines that came into effect in 2007, by themselves are expected to result in thousands of premature deaths avoided annually at full implementation and billions in annual monetized benefits from health and environmental improvements. Recent regulations such as the diesel standards have benefits far in excess of costs—for example the non-road diesel rule is estimated to have benefits that are 40 times the costs of the rule. Not only can we achieve these benefits without harming the economy, we know that a healthy population, with fewer demands on health care and less absenteeism at work and school, are key to promoting a competitive, flourishing economy. Smart environmental regulation can improve the economy in a number of ways.

- 1) We are healthier and smarter as a result of environmental regulations. Our enhanced health makes us miss less work, less school, and lowers our demand for health care. With lower rates of birth defects, childhood illnesses and disabilities, and the economy should spend less on health care.
- 2) Regulations improve our nation's water, air and land, which in turn support large recreational and commercial industries. Cleaning our air, water, and land, can be viewed as investments in critical infrastructure. Clean water supports fishing, boating, and other recreational industries. For example, recreational boating alone has an economic impact on the economy of roughly \$40 billion per year. Commercial fishing, also supported by clean water, is responsible for over \$100 billion a year in economic impact on the economy. Cleaning up waste sites, returns valuable land to the economy to be put back to productive use, creating jobs and economic growth.
- 3) Regulations can result in innovations and new industries as emitters look for cheaper ways to meet regulatory requirements. Many of our leading industrial firms have publicly acknowledged the role that regulations have played in rethinking production and business practices. These innovations have created new products that can be sold here and abroad. (Some specific examples are).
 - Working to comply with relatively new regulations in effect in 1975 (placing scrubbers on smokestacks, treating effluents before releasing wastewater, and segregating some solid waste for incineration) led 3M to work on pollution prevention to eliminate rather than having to treat as much pollution as possible.
 - Toxic Release Inventory reporting helped DuPont realize in the 1980s that it was one of the world's biggest polluters despite spending \$1 billion annually on waste treatment and pollution controls. This prompted management to work on cutting both emissions and costs, and resulted in reducing expenditures to \$400 million annually, according to DuPont.
 - British Petroleum committed to reduce emissions of greenhouse gases in the late 1990s and within three years found numerous ways to cut emissions, improve efficiency, and reduce costs.

Q6. *In the past few months, there has been a burgeoning interagency effort between DOE, NASA and NOAA to create a Greenhouse Gas Information System. This system would be used to assess emissions, offsets and baselines that many have stated would be necessary for any new international obligations, since right now, emission uncertainties of the top 5 global emitters of greenhouse gases match or exceed total emissions of the rest of the world.*

a. *First of all, why is EPA not a part of this effort if a baseline would be required for your agency to establish any regulations dealing with carbon dioxide? Who collected the information for the baseline that was the foundation of the Acid Rain Program?*

A6a. EPA has participated in discussions about a potential GHGIS, including attendance by EPA greenhouse gas monitoring experts at the May 20–22, 2009 scoping meeting in Albuquerque, New Mexico, and numerous follow-up discussions with technical staff from other agencies. EPA, DOE, NASA, and NOAA have found these discussions to be helpful in further clarifying greenhouse gas data needs for policies and programs (i.e., beyond current research needs). EPA also made a presentation to the National Research Council panel compiling the report on “Verifying Greenhouse Gas Emissions: Methods to Support International Climate Agreements”.

The emissions baseline for the Acid Rain Program was calculated on the basis of two data sources: (i) facility-level emissions rates from the 1985 National Acid Precipitation Assessment Program, and (ii) heat input data for the same facilities for 1985, 1986, and 1987 from the Energy Information Administration. The National Atmospheric Deposition Program (NADP) collected baseline data on actual wet sulfate and nitrate deposition, and was supplemented with data on dry sulfate deposition in the late 1980s through the Clean Air Status and Trends Network (CASTNET).

b. *Shouldn't a system like this be in place before we would be able to even enter into international negotiations? How many treaties are negotiated when nations are not aware of their own starting points?*

A6b. For the purposes of establishing baselines for potential greenhouse gas programs in the U.S., EPA will have significantly better facility-level emissions data than were available for the start of the Acid Rain Program because of the Mandatory Reporting Rule (MRR) for greenhouse gases.³ The MRR will provide EPA with monitored greenhouse gas emissions data from approximately 10,000 facilities across the country emitting over 25,000 million metric tons of carbon dioxide equivalent, representing approximately 80–85% of national greenhouse gas emissions. The first facility-level emission reports are due March 31, 2011.

Data needs to support an international treaty depend on the requirements of the treaty. The foundation for the United Nations Framework Convention on Climate Change (UNFCCC) is the national greenhouse gas inventory rather than facility-level data. Parties to the UNFCCC have submitted national reports on greenhouse gas emissions, which provide a starting point for current and future negotiations. The recently published National Academies report titled “*Verifying Greenhouse Gas Emissions: Methods to Support International Climate Agreements*” stated that “UNFCCC procedures have been, and will likely continue to be, the primary means for monitoring and verifying greenhouse gas emissions and reductions under a new international climate treaty.” The report also concluded that “each country could estimate fossil-fuel CO₂ emissions accurately enough to support monitoring of a climate treaty.” EPA, USAID and the State Department are working with developing countries to improve their greenhouse gas inventories, particularly in the area of landuse, land-use change and forestry.

Q7. *During the hearing, I questioned you if you had any knowledge of EPA scientists who question the IPCC data and the heavy reliance of that data in EPA's endangerment finding. You stated you had no knowledge of them since there were so many scientists at EPA.*

a. *Since that time, what have you done to determine whether or not scientists at EPA question the veracity of the IPCC data or have concerns about EPA's use of the data as a substantial justification for the endangerment finding?*

b. *If you have not taken any steps to determine this, do you plan to and how will you go about doing it?*

³PART 98—MANDATORY GREENHOUSE GAS REPORTING. <http://www.epa.gov/climatechange/emissions/downloads09/GHG-MRR-FinalRule.pdf>

A7. As I stated in my answers at the hearing, EPA, and myself personally, have a commitment to scientific integrity. To quote Albert Einstein, “the right to search for the truth implies also a duty; one must not conceal any part of what one has recognized to be the truth.” That means that it would be unnecessary for me to seek out scientists with a particular opinion. Any scientist has the opportunity to provide scientific evidence relating to this or any other science issue to me. Therefore, I have no plans to poll EPA scientists on this issue.

Q8. *During the hearing, I asked you if you thought that EPA should go back and review the scientific basis for its findings given the many questions that have arisen about the quality of the data used by the IPCC. Since this time, the InterAcademy Council has been requested by the UN to conduct an independent review of the IPCC processes and procedures. This request illustrates the grave concerns of the international community of the quality of data and conclusions presented in the 4th Assessment Report.*

a. How does this demonstration of lack of trust in IPCC results affect EPA’s scientific assessment used for the endangerment finding?

A8a. We do not agree that the U.N.’s request for an InterAcademy Council review demonstrates a lack of trust in the IPCC or calls into question the current understanding of climate change science and the causal linkage between human-caused greenhouse gas emissions and warming of the climate system. We note that the IPCC reports were one of several broad assessment reports that the Agency drew upon in developing the Findings, along with the wealth of information submitted through public comment to inform the decision. The Findings do not rely on a single line of evidence, a single study, or a single assessment report. Other assessment reports, in particular those of the U.S. Global Change Research Program and National Research Council have also examined the information, taken a fresh look at the literature and existing assessments, and reached similar compelling conclusions regarding the threat of climate change, in many case reinforcing the key findings of the IPCC.

b. If this review reveals that data that counters the conclusions of the report were purposely excluded, would EPA be inclined to review the scientific assessment?

A8b. The InterAcademy Council review will help guide the processes and procedures of the IPCC’s current and future assessments of climate science. We look forward to seeing the results of this review and believe they can only serve to improve an already sound and transparent process.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. Jane Lubchenco, Administrator, National Atmospheric and Oceanic Administration

Questions submitted by Chairman Bart Gordon**NOAA Climate Service**

In the FY11 budget proposal, the Office of Oceanic and Atmospheric Research (OAR) received a \$15.8 million increase. This line office is the primary research arm of NOAA and according to the Agency's most recent announcement to establish a new Climate Service, a majority of OAR programs and activities will be moved to the new Climate Service Office.

Q1. How does the agency plan to protect and strengthen the current robust research in OAR while attempting to align the research with the new Climate Service?

A1. Science is an essential component of all NOAA responsibilities, and underpins our ability to provide quality services. This re-organization does not take away or diminish any of NOAA's current capabilities. Rather, it re-organizes them to better complement and support each other. In NOAA and the Department of Commerce's current plan, not all research will be moved into this new line office, and OAR has not been replaced by the Climate Service. It is also NOAA's intention that OAR will retain many of its core research functions and continue to serve an important role at the core of a dedicated science and research enterprise that advances NOAA's mission and strategic priorities.

OAR has served as the incubator for much of the science and discovery that opened the eyes of the world to the risks of greenhouse gas emissions, climate change, and ocean acidification. It is critical to constantly improve all NOAA services, as well as to ensure that NOAA remains on the cutting edge of oceanic and atmospheric scientific discovery, helping to discover and respond to the next major challenge. Strategically focusing OAR's expertise and capabilities toward the next generation of science challenges for NOAA and the Nation, as well as strengthening science across the agency, remain top priorities for NOAA.

We are taking a number of steps to strengthen science across the agency, including re-instating the position of NOAA Chief Scientist, and making it a vital part of the NOAA headquarters leadership team. This position will be on a par with the two Assistant Secretary positions. The Assistant Administrator for OAR will serve as the principal advisor to NOAA's Chief Scientist on research matters, and in this capacity is charged with strengthening science and coordinating and integrating research across NOAA's Line Offices and with external partners.

We also have developed a plan to actively involve scientists and science leaders across the agency, as well as external academic partners, in the development of our research strategy for the future, and to use our NOAA Research Council to strengthen formal mechanisms for evaluating our research activities. OAR has a significant leadership role within NOAA in driving the agency forward as our research strategy is developed. As part of this process, Dr. Paul Sandifer, the Senior Science Advisor, acting on behalf of the Office of the NOAA Chief Scientist, is working with the current OAR leadership and the NOAA Research Council to develop corporate guidance for establishing consistent, agency-wide peer review and monitoring processes for all NOAA scientific activities, including an annual State of NOAA Research Report. Per Dr. Lubchenco's direction, active researchers from across the agency are playing major roles in this visioning and planning effort.

The future of NOAA's science and research enterprise relies heavily on OAR's core atmospheric and oceanic science expertise and capabilities to be the research innovation, integration, and incubation hub for the agency. NOAA's vision for reorganization ensures that OAR is well-positioned to provide the leadership and cutting edge research necessary to spur innovation, resulting in new technologies and improved services for the Nation, while support the priority scientific and research areas critical to advancing NOAA's mission. NOAA is committed to strengthening science and maintaining a strong research portfolio that serves the Nation's needs.

Q2. In your testimony you also highlighted NOAA's FY11 request of \$435 million in support of the U.S. Global Change Research Program (USGCRP). How does NOAA envision their proposed Climate Service to interface with the USGCRP?

A2. NOAA understands that no single agency can or should provide all climate services for all people. NOAA routinely engages with its federal partners and will continue to utilize the framework developed by the U.S. Global Change Research

Program (USGCRP) to ensure that our climate service efforts are coordinated across Federal agencies. In addition, we are actively supporting, in partnership with our sister agencies, the development of the next National Assessment. Information produced from across the agencies are critical to the development of this report. The National Assessment will also be an opportunity for the agencies to further discuss how we can effectively collaborate in strengthening climate science, and the delivery of information and science based decision support tools. NOAA's proposed Climate Service and its interface with USGCRP are under development.

In addition, bilateral discussions are in progress with a variety of agencies to understand how NOAA climate services can complement their missions, and how other agencies' information and expertise can benefit NOAA climate services. NOAA understands that the relative roles and responsibilities of individual agencies will differ depending on the climate impact issue being addressed (e.g., water resource management, disaster risk reduction, community planning, public health) and that an effective response to the changing climate conditions will require an integrated, flexible, and responsive government-wide approach.

NOAA is committed to working with our federal partners to provide the best and most relevant climate services and information to decision makers across all sectors. NOAA already participates fully in a number of inter-agency efforts including co-chairing the Federal Interagency Climate Change Adaptation Working Group with the Council on Environmental Quality and the Office of Science and Technology Policy, serving as Chair of and leading many assessments for the U.S. Global Change Research Program, and collaborating with the White House Office of Energy and Climate Change.

Data Centers and Information Services

The budget request contains a \$14 million decrease for the Data Centers and the Information Centers. This is a concern because substantial investments in several satellite systems will create an influx of data and information to the Data Centers.

Q3. How does the Agency plan to process and distribute these data with the proposed FY11 level funding?

A3. The \$14 million decrease represents funds associated with Congressionally-directed projects contained in the FY 2010 Omnibus Appropriations bill for climate database modernization and for regional climate centers and programs that are not included in the President's FY 2011 budget request.

The President's FY 2011 budget request for NOAA's Data and Information Services does include a \$13 million increase over the FY 2010 enacted amounts in the Archive, Access, and Assessment line, as well as an additional \$600,000 increase to pay for inflationary adjustments and salary increases to support Data Center base operations. These increases directly support the ability of NOAA's Data Centers to archive and provide access to the anticipated 3,000 percent increase in data volume expected over the next several years, and are critical to NOAA's ability to develop the datasets that are required to meet customer needs.

Of the \$13 million increase, \$2 million would support integration of Comprehensive Large-data Array Stewardship System (CLASS) components into the NOAA Data Center operations at the National Climatic Data Center in Asheville, NC; the National Geophysical Data Center in Boulder, CO; and the National Oceanographic Data Center in Silver Spring, MD. This funding would provide NOAA the operational capability to allow users to search for and acquire the increased amount of archived data. The proposed increase would provide the Data Centers with the information technology infrastructure to accommodate the increased data volume and ensure environmental observations remain useful and available to the widest range of current and future users. Users will be able to search for and acquire archived CLASS data through the NOAA Data Center archive management system. This proposed budget increase also meets emerging requirements associated with implementing NOAA's climate services, including the long-term preservation of the Nation's climate record.

The remaining increase of \$11 million would support continued work on the NOAA Climate Data Records program, which transforms raw satellite data into unified and coherent long-term environmental observations and products that are critical to climate modelers and decision makers concerned with advancing climate change understanding, prediction, mitigation and adaptation strategies, policies, and science.

NOAA Education Program

As the Committee prepares to reauthorize the COMPETES Act, it is important for agencies like NOAA to demonstrate the importance of investing in the education of our future scientists and engineers.

Q4. Within the proposed FY11 budget for NOAA's Education Program, how does the Agency plan to develop a future workforce in disciplines related to NOAA sciences?

A4. NOAA's Office of Education supports a broad spectrum of Science, Technology, Engineering and Mathematics (STEM) activities through formal and informal mechanisms to support the development of a future workforce. NOAA's education activities are conducted through competitive grants to academic institutions and direct scholarships to students. NOAA supports STEM programs at academic institutions that train and graduate students in STEM disciplines at the K-12 and post-secondary levels. Cumulative student data collected by NOAA's Office of Education demonstrates that from 2001 through 2009 approximately 2,400 students were training in STEM fields that directly support NOAA's mission. This number includes graduate and undergraduate level students supported exclusively by the Office of Education through graduate and undergraduate scholarship programs. One of NOAA's primary goals is to provide opportunities for students to engage in hands-on research activities under the guidance of NOAA scientists and managers. These experiences engage and retain students in STEM fields and encourage students to seek employment in STEM disciplines related to NOAA sciences.

Also since 2001, NOAA has hired 61 former recipients of student training and scholarship opportunities, offered through the Office of Education, in STEM disciplines.

Q5. What resources does NOAA need to contribute to the development of such a workforce?

A5. The President's FY 2011 Budget Request includes \$20.8 million for NOAA's Office of Education to support both formal and informal education activities in STEM fields as well as devoting one-tenth of one percent of NOAA's entire appropriation to Hollings Scholarships. NOAA has been successful in providing training and scholarship opportunities to students in STEM disciplines that support the agency's mission and that serve as a potential pool of candidates from which it can select its future workforce. NOAA will continue to utilize its extensive workforce with expertise in STEM disciplines to serve as mentors and provide technical guidance to students pursuing degrees and careers in STEM fields that support NOAA's mission.

QuikScat

The QuikSCAT satellite provided ocean vector wind data and marine wind forecast data, which were useful in the early stages of predicting hurricane tracks. QuikSCAT's operational life ended last November, and the FY11 budget request does not seem to demonstrate an investment in resources to replace QuikSCAT's capacity. It should be noted that the National Research Council's Earth Sciences Decadal Survey recommended that NOAA proceed with the Extended Ocean Vector Wind Mission.

Q6. What is the status of NOAA's decision to proceed with the Extended Ocean Vector Wind mission?

A6. As directed in FY 2009 and FY 2010 omnibus appropriations bills, NOAA and the National Aeronautics and Space Administration (NASA) continue to assess the best ways to replace space-based scatterometry data that had been provided by the NASA QuikSCAT satellite until November 2009.

As part of this assessment, NOAA and NASA/Jet Propulsion Laboratory are studying the suitability of developing a scatterometer and are exploring with the Japanese Aerospace Exploration Agency the possibility of a joint mission.

Q7. What are NOAA's plans to recover the invaluable QuikSCAT data, which helped improve weather forecasts and identify the location, size and strength of hurricanes and other storms?

A7. The NASA QuikSCAT mission demonstrated utility to NOAA in meeting its mission for open ocean measurements beyond the reach of "hurricane hunter" aircraft and land-based radars. However, please note that NOAA's ability to warn the public about hurricanes making landfall in the continental U.S. is not significantly diminished in the absence of QuikSCAT. In most cases, due to availability of other data sources close to the coast QuikSCAT, ocean surface vector wind data has little or no impact on these forecasts.

As a result of the NASA QuikSCAT failure, NOAA continues to pursue both short-term and long-term mitigation strategies for ocean surface vector wind (OSVW) measurements. Short-term mitigation options include improving the use of satellite data from partners, such as the Advanced SCATterometer (ASCAT) instrument from the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). While ASCAT has differing OSVW capabilities than NASA QuikSCAT, it does provide partial mitigation of the NASA QuikSCAT failure.

In addition, India launched the research satellite Oceansat-2 in September 2009, which has a NASA QuikSCAT-type instrument. NOAA is working on an agreement to gain timely access to data provided by the satellite. The quality of the data and instrument has not yet been demonstrated, and India does not yet have the capability to deliver data in a timely enough fashion to be useful for operational forecasting. China is planning to launch HY-2A, a QuikSCAT-type instrument, in late 2010. NOAA continues to attempt to engage China in discussions about acquiring access to their data.

NOAA and NASA are continuing studies to develop an OSVW instrument and are exploring opportunities to have the instrument placed on-board the Japanese Aerospace Exploration Agency's Global Change Observation Mission-Water mission.

Geoengineering

Q8. What science and research is needed to be able to better understand the impacts of potential climate geo-engineering projects? What research capabilities, both internal to the agency and through external partnerships, could NOAA lend to better understanding these impacts?

A8. Geo-engineering proposes to deliberately manipulate the Earth's climate to counteract the effects of global warming from greenhouse gas emissions. To be fully successful, however, a large scale geo-engineering effort would require full scientific understanding of the underlying physical and chemical processes, the inclusion of these processes in Earth system models, and verification of the geo-engineering approach's viability with model projections by experts. Recent literature and workshops have emphasized the difficulties of identifying unforeseen and unintended consequences that a geo-engineering effort would possibly generate. Thus it is believed that geo-engineering must be approached with great deliberation and caution.

At least two areas of geo-engineering need extensive research. One is the need to investigate the physical, chemical, and biological processes of geo-engineering approaches. For example, the addition of elements such as iron to the open ocean to draw carbon dioxide from the atmosphere has been tested in some small scale studies; however, results so far are inconclusive, and at least one study suggests the addition of iron would have the opposite effect. Far more directed research is needed to fully understand all of the ramifications of a large geo-engineering effort. Similarly, ideas for release of chemicals into the stratosphere to increase reflection of incoming solar radiation would need further study of both natural and manmade efforts to calculate the effects of such a release.

A second area is research on the effects of a geo-engineering scheme on global economic sectors. For example, a project that decreases solar radiation (e.g. by shading from satellites, or stratospheric aerosols) could also decrease precipitation selectively, which could have detrimental impacts on agricultural efforts in the effected region. Similarly, geo-engineering that decreased sunlight for an extended period of time and then terminated could provide a shock to the geophysical system. Such large-scale changes to the amount of heat and light that the Earth receives from the sun can introduce large and potentially dangerous adjustments in Earth's climate.

The complexity of geo-engineering suggests that significant progress in global observing, research understanding, and modeling would be required before the potential for geo-engineering could seriously be considered. Current work in these areas is done by NOAA, other parts of the federal government, university and industry partners, and the international community. The uncertainties associated with geo-engineering will require enhanced communication and expanded efforts among all of these partners.

Questions submitted by Representative Ralph M. Hall

Q1. Dr Lubchenco, in some of your budget briefings around the country, we have noted that you have used the terms "incubation" and "innovation" in stressing the priority of NOAA's science mission and in advocating for enhancement of the NOAA research enterprise. We agree. With the Office of Oceanic and Atmos-

pheric Research, or OAR, the whole really is greater than the sum of its parts. There are so many synergistic, interdisciplinary science efforts that contribute to maximizing the return on NOAA's research investment for innovation; innovation both for fundamental scientific discovery and the creation of new knowledge and technology to advance NOAA's service and stewardship missions. Coordination and collaboration is the key to an innovation culture which must bring in the social sciences to enhance the value and use of the physical, biological and chemical R&D.

a. How will this innovation culture be enhanced in a smaller, divided OAR?

A1a. Strengthening science and fostering a culture of innovation remains a critical priority element of NOAA's efforts. The research enterprise at NOAA consists of much more than research on climate. NOAA and the Department of Commerce's plans to submit a proposal to create a Climate Service Line Office in NOAA are part of an overall effort to strengthen the critical science and services NOAA provides the Nation. OAR's science programs and laboratories that do not transfer to the Climate Service will continue to serve NOAA broadly in many important ways, including:

- Serving as the nexus for integration of research across NOAA;
- Advancing science and technology innovation efforts that support the purposes of the America COMPETES Act;
- Improving observing, modeling, and understanding of how ocean, Great Lakes, and coastal ecosystems function, including climate impacts;
- Building capacity for social, behavioral, and economic science within NOAA;
- Continuing to advance NOAA's core research and development capabilities in weather radar, forecast systems, air quality, hurricane forecasts;
- Driving innovation in technology and advancing knowledge as we explore the ocean; and
- Positioning NOAA to anticipate the scientific challenges of the coming decades.

As we move forward, NOAA believes that a renewed focus on the capabilities with for innovation and transformational research will support fundamental scientific discovery and the creation of new knowledge and technology to advance NOAA's service and stewardship missions. For example, a key area for a strategic long-term focus would be ocean and Great Lakes ecosystem science that integrates the chemical, physical, geological and human components at the ecosystem scale. It is our intent that OAR's programs will support all of NOAA by identifying, adapting, developing, assessing and promoting innovation and transformational, state of the art research, and will coordinate, integrate, and support these efforts throughout the agency. The research leadership provided by OAR supports the agency's mission—and the broader U.S. environmental, social, and economic sectors—through increased knowledge and novel advances in technologies.

We are also taking a number of steps to strengthen science across the agency, and OAR is central to these efforts. Among these actions is the reinstatement of the position of NOAA Chief Scientist, and making it a vital part of the NOAA headquarters leadership team. This position will be on a par with the two Assistant Secretary positions. Another such action is the expanded role of the OAR Assistant Administrator who will serve as the principal advisor to NOAA's Chief Scientist on research matters, and in this capacity is charged with strengthening science and coordinating and integrating research across NOAA's Line Offices and with external partners.

It is our intent that OAR's programs will support all of NOAA by identifying, adapting, developing, assessing and promoting innovation and transformational, state of the art research, and will coordinate, integrate, and incubate these efforts throughout the agency. The research leadership provided by OAR supports the agency's mission—and the broader U.S. environmental, social, and economic sectors—through increased knowledge and novel advances in technologies.

b. How will a diminished OAR provide for better weather understanding and safety, ocean planning and use, ecosystem protection, arctic science and exploration, new energy resources support, as well as an open and evolving climate service effort given that these are so inter-related and inter-dependent?

A1b. In planning for a Climate Service Line Office in NOAA, great care was taken not to diminish the foundation of research in those programs that would not be transferred. As NOAA and the Department of Commerce work to develop a request to establish a climate service, we are focused on the role of the Office of Oceanic

and Atmospheric Research to incubate research and development that leads to new knowledge as well as many valuable products and services, many of which are transferred to the private sector and commercialized. NOAA anticipates that OAR will continue to function as a central research unit that works across line offices to integrate, incubate, and innovate research and development in a number of key mission areas. OAR has been responsible for many significant contributions that opened the world's eyes to the risks of greenhouse gas emissions, climate change and ocean acidification. It is the scientific advances and discoveries that have come from OAR's research laboratories and programs that have brought us to this point now where we see a demonstrable need for NOAA's climate services. The plans, while still under development, to create a Climate Service in NOAA will not diminish the research that OAR contributes to help identify the Nation's next major challenges and ensure NOAA is equipped to help face them. Support for strengthened research efforts within OAR and strengthening of science throughout the NOAA enterprise remain top priorities for NOAA.

The FY 2011 Budget Request for NOAA demonstrates how science will be strengthened within OAR. The President's Budget requests \$5.6 billion for NOAA and includes investments to: strengthen NOAA's science, promote economic development, strengthen energy and security, sustain oceans and coasts, and protect lives and livelihoods. The FY 2011 Budget also highlights the role that NOAA's innovations in science and technology have played in ensuring that a strong economy and a healthy environment go hand in hand. NOAA is a leading sponsor of oceanic and atmospheric research and is one of the key sponsors of climate science capabilities in the federal government. NOAA's request for research and development in FY 2011 is \$949.1 million, 17 percent of the \$5.6 billion total NOAA request. Highlights of the FY 2011 budget include:

- *Climate*: Increased funding for climate assessment services, the completion of a regional carbon observation and analysis system, increased Arctic climate observations and research, and transitioning key climate sensors on to NOAA operational platforms (Joint Polar Satellite System).
- *Weather and Air Quality*: Increased funding for improved extreme precipitation forecasts and demonstrations of cutting edge radar technology to replace aging operational weather and aircraft-tracking radars.
- *Ocean, Coastal, and Great Lakes*: Increased funding for ocean acidification research and monitoring, aquaculture research, climate-related coastal hazards research, and Integrated Ecosystem Assessments for fishery ecosystems in the Gulf of Mexico, California Current, and the Northeast Shelf.

Q2. *Dr Lubchenco, are you familiar with a report titled, "Review of the Organization and Management of Research in NOAA"? This report was done by a Research Review Team for NOAA's Science Advisory Board and submitted in August of 2004. Several passages of this report appear to contradict the purpose and structure of the current NOAA proposal on a Climate Service. For instance, the report says:*

- *"Regarding the issue of migrating NOAA research to the line offices, this is not a wise course of action . . . The major challenge for NOAA is connecting the pieces of its research program and ensuring research is linked to the broader science needs of the agency . . . This is best done by strengthening organizational processes, clarifying shared responsibilities regarding transition of research, and establishing a higher level of corporate oversight . . . The dissolution of OAR and distribution of its resources and talent to the other line offices would splinter rather than more tightly connect the science and research enterprise. There is undoubtedly a need to improve the linkage of research to operations and change the culture of OAR to value and support this linkage. However, breaking OAR apart and distributing the parts to other line offices would be a mistake."* Pg. 29.
- *"The near-term pressure inherent in the operational line offices raises serious questions about their viability as appropriate homes for developing the operational products of the future . . . There are observations and research products that are produced routinely (e.g., measurements of greenhouse gas concentrations for climate studies) but are not routine—namely the quality of the observations and the sensitivity required to monitor and constantly upgrade them requires a research environment."* Pg. 33.

Why does the current proposal to create a climate service depart so dramatically from the recommendations of NOAA's own advisory board?

A2. The 2004 NOAA Science Advisory Board (SAB) Research Review Team's scope was intended to look at NOAA's overall research enterprise, not at the creation of a new science and service organization. Consistent with that report, NOAA is actively working to strengthen science and preserve a dedicated science and research enterprise within the agency. Any re-organization will be carefully constructed so as not to take away any of NOAA's current capabilities. Rather, it re-organizes them to better complement and support each other.

In addition, subsequent reports from NOAA's Science Advisory Board, and from other major advisory panels such as the National Research Council, state the need for close association and integration of climate research, science and services. Our announced intention to create a Climate Service follows the recommendations of these reports.

Examples of these reports include:

- *A Climate Services Vision: First Steps Toward the Future* (2001)—“If a climate service function is to improve and succeed, it should be supported by active research.”
- *Final Report of the Review of the NOAA National Climate Services Strategy* (2008)—NOAA Science Advisory Board report. A guiding principle of a climate service: “Ensure that climate services are integrated with active research with feedbacks that will directly impact the generation of new climate service capabilities and climate services, and in turn, will directly influence research directions.” (Pg. 4)
- *Options for Developing a National Climate Service* (2009)—“A key attribute: The Service will achieve its mission by promoting active interaction among users, researchers, and information providers.” (Pg. 5)
- *Restructuring Federal Climate Research to Meet the Challenges of Climate Change* (2009)—Top priorities are “Reorganize the program [USGCRP] around integrated scientific-societal issues to facilitate crosscutting research focused on understanding the interactions among the climate, human, and environmental systems and on supporting societal responses to climate change” (Pg. 4) and “Coordinate federal efforts to provide climate services (scientific information, tools, and forecasts) routinely to decision makers . . . Regardless of where the service is established, the restructured climate change research program would have to be involved in the research and development of experimental products (e.g., regional predictions), tools (e.g., models), and outreach services needed to support stakeholders. The climate service could then use the tools to create products operationally. Maintaining strong links to the research program would also help the climate service take advantage of new capabilities.” (Pg. 8)
- *Informing Decisions In a Changing Climate* (2009)—“Recommendation 9: The federal government should undertake a national initiative for climate-related decision support under the mandate of the U.S. Global Change Research Act (USGCRA) and other existing legal authority. This initiative should include a service element to support and catalyze processes to inform climate-related decisions and a research element to develop the science of climate response to inform climate-related decisions and to promote systematic improvement of decision support processes and products in all relevant sectors of U.S. society and, indeed, around the world.” (pg. 5)
- *Climate Working Group (CWG) of NOAA's Science Advisory Board Meeting Report for Fall 2009* (2009)—“The CWG believes strongly that research needs to be an integral part of moving forward on climate services.” (Pg. 2)

References:

- Barron, E. J, (Chair), et al., 2001: *A Climate Services Vision: First Steps Toward the Future*. Board on Atmospheric Sciences and Climate, National Research Council, Washington, DC.
- Barron, E. J, (Chair), et al., 2009: *Options for Developing a National Climate Service*. Report to NOAA's Science Advisory Board. 83 pages. http://www.sab.noaa.gov/Reports/2009/NCS_Report_FinaltoNOAA_6_5_09-1.pdf
- Busalacchi, A. (Chair of Climate Working Group), Barron, E. J, (Chair of Review Team), et al., 2008: *Final Report of the Review of the NOAA National Climate Services Strategy*. Report to NOAA's Science Advisory Board. 7 pages. http://www.sab.noaa.gov/Reports/2008/NOAA_SAB_CWG_NCS_Review_Sep08_FINALtoNOAA.pdf

Busalacchi, A. (Chair of Climate Working Group), et al., 2009: Climate Working Group (CWG) of NOAA's Science Advisory Board Meeting Report for Fall 2009. Report to NOAA's Science Advisory Board. 5 pages.

Corell, R. W., (Chair), et al., 2009: Informing Decisions In a Changing Climate. Panel on Strategies and Methods for Climate-Related Decision Support, Committee on the Human Dimensions of Global Change, Division of Behavioral and Social Sciences and Education, National Research Council. 198 pages

Ramanathan, V. (Chair), et al., 2009: Restructuring Federal Climate Research to Meet the Challenges of Climate Change. Committee on Strategic Advice on the U.S. Climate Change Science Program; National Research Council. 178 pages

Q3. *Last November, NOAA's Science Advisory Board produced a report titled, "NOAA Science Advisory Board Climate Information Products and Applications Program Review"? This report is based on a Climate Working Group Review Panel Meeting held last July.*

- a. *The panel recommended that NOAA develop a strategic plan and strategic framework for its climate information products, applications and related services. Specifically, the plan should, "Differentiate between work that is essentially research or experimentation aimed at product development and definition and work that is operational, or service oriented, and provide for the appropriate balance between the two." (Pg. 9). How do you plan to keep research and operational missions separate once you pull them into the same line of office?*

A3a. A foundational principle for integrating science and services within a Climate Service proposal is that excellent climate services and products are inextricably linked to a robust scientific basis. However, that brings about the challenge of: how can NOAA guide the development of a mutually-supportive Climate Service which both strengthens climate science and develops better climate service?

The answer lies in the development and adoption of an organizational structure, service development and delivery models, and business practices that recognize and incorporate the foundational importance of current and sustained future investments in scientific research and, at the same time, provide for the development of operational services that are responsive to user needs. These practices will identify and address existing barriers for collaborative research and service partnerships especially in the transition of research to operations both within NOAA's Climate Service and the interactions outside of the Climate Service. Clear business practices, and a governance model to maintain balance of operations and research, will have to be adhered to that safeguard resources for, and prevent the erosion of, climate research in providing the best available science for the services, while enhancing the availability of resources for new operational services. A cross-NOAA team of scientists and service experts are currently working to develop the strategic plan and framework called for by the working group.

- b. *There were nine different programs identified in the report that have already been engaged at the regional level, have built relationships with the user communities and provide high-quality climate services. These include:*
 - i. *The International Research Institute for Climate and Society*
 - ii. *Regional Integrated Sciences and Assessments (RISA)*
 - iii. *Regional Climate Centers and State Climatologists (RCC)*
 - iv. *National Weather Service Climate Service Program Managers and Focal Points*
 - v. *National Integrated Drought Information System (NIDIS)*
 - vi. *Sea Grant, and Sea Grant Extension*
 - vii. *Coastal Services Center*
 - viii. *National Estuarine Research Reserves*
 - ix. *NOAA regional Collaboration*

However, only the RISA, RCC and NIDIS programs have been identified as slated to be moved into your new Climate Service line office. What is the rationale for leaving the rest outside of the Climate Service? Why move some but not others?

A3b. NOAA has an extensive regional enterprise consisting of assets from across Line Offices that serves a variety of NOAA's mission areas. Many of these assets contribute to NOAA's climate service development and delivery, while also providing strategic support to other agency priorities. When evaluating which regional entities

would be appropriate for inclusion in a Climate Service, the level of investment in climate services relative to other issue areas was examined. From the above list, the RISA, RCC, NIDIS, and the International Research Institute for Climate and Society programs have been identified as candidates to be moved into NOAA's Climate Service Line Office because their focus is primarily climate oriented. The other programs listed do not have a climate-related mission as a primary focus; they mainly have an ecosystem focus. The NOAA Regional Collaboration is a set of teams of NOAA line office leaders who serve to look across NOAA's broad suite of regional activities and coordinate and communicate those activities to regional stakeholders. Through business practices and cross-NOAA agreements; however, it is envisioned that the Climate Service will work closely with these other programs and the NOAA Regional Collaboration teams.

The Climate Service would incorporate a number of NOAA's climate science, research and observation centers, as well as some of its data and service delivery infrastructure. This arrangement would provide a strong climate research to service enterprise under a central management authority to further the goal of having a single, authoritative source of climate information. The overarching goals behind the reorganization are to not only establish a climate service, but to strengthen NOAA science and to implement the Administration's priorities. The criteria for the proposed design include: establishing climate leadership, enhancing climate program coordination, and promoting user engagement on climate.

c. The report recommends conducting an initial comprehensive national assessment of existing climate services and unmet service needs to guide strategic planning. Have you undertaken any such assessment?

A3c. The White House Office of Science and Technology Policy (OSTP) is in the process of reviewing these activities across the federal government. Additionally, there is work being done to establish an OSTP-led interagency process—a federal climate services roundtable—to assess and coordinate climate services across the relevant agencies.

The Global Climate Change Impacts report identifies some of the unmet needs for climate research and information at the national and regional scales. Additional information regarding unmet needs will be gathered through sustained stakeholder engagement coordinated through NOAA's six new regional climate service directors, as well as other NOAA programs and offices with expertise in needs assessment, such as the Coastal Services Center and Sea Grant. Guidance solicited from other user and climate service provider groups also will be considered during NOAA's strategic planning, such as the Regional Integrated Science and Assessments, Regional Climate Centers, and National Weather Service climate focal points. NOAA plans to continue improving our climate sciences and services based on a sustained two-way dialogue with users and stakeholders.

NOAA has much to contribute to addressing the Nation's need for improved climate science and services. NOAA's announcement, outlining plans to better align NOAA assets into a functional climate service, is a major step forward for this Administration in strengthening its capability to understand and adapt to climate change. NOAA is well-positioned, and ready and willing to lead as the federal government strives to best equip the Nation to face the challenges of a changing climate.

d. The report recommends developing and maintaining a database of climate service activities across all NOAA programs. Where are you in the development of this database? Can such a database be built before undertaking a national assessment of existing services?

A3d. Within NOAA, the National Climatic Data Center and other NOAA entities have produced products and services catalogs that include inventories of their climate-related products, services, and activities. NOAA's business practices include an ongoing evaluation of annual activities and implementation plans through its annual operating plans, which would be applied to climate services activities. NOAA will continue to refine its systems for tracking these activities before undertaking a national assessment of existing services.

NOAA also recently released the NOAA Climate Portal (<http://www.climate.gov>), which is intended to provide one stop access to all of NOAA's climate information, products and services. The portal is a dynamic, innovative access point that is continuously updated with the most recent useful information about the state of the climate, scientific understanding, and available products and services. While currently in its early stages, NOAA is beginning to dialogue with other agencies about linking their climate data and information to the portal, in addition to building out the full NOAA component of the portal.

- e. *The report recommends clearly outlining the roles and responsibilities of each of the nine programs. Has this been done yet? If not, when will it be completed?*

A3e. Over the past two years, NOAA has been actively engaged in evaluating climate service activities within the agency, as well as the contributions and needs of our partners and the greater user community. These efforts are culminating in a proposal to reorganize that will be submitted to Congress for approval.

As part of NOAA's request, the roles and responsibilities of NOAA programs directly affected by the organizational change will be evaluated and defined. We are looking forward to this being completed in the fall, with input from the National Academy of Public Administration (NAPA) study recently completed. NOAA's proposal has benefited greatly from the NAPA study process, and there is a great deal of alignment with the NAPA Panel's recommendations. Additionally, NOAA is working closely with the Climate Working Group of the Science Advisory Board to gain advice, input, and guidance.

Q4. *The Climate Research and Modeling Program Review conducted by the Climate Working Group in March of 2008 detailed many findings, concerns and recommendations. The group did not recommend moving half of OAR into a Climate Service line office. Specifically, they found that:*

- *“Reorganization is not an adequate response to achieve more effective integration of NOAA.”*
- *Strategic planning and management is required for the line offices to work more collaboratively.*
- *“This panel notes that presentations suggested new directions for NOAA in the development of Climate Services. Two examples were the development of an attribution capability and the use of model predictions to inform policy. The Panel is concerned by this apparent expansion of mission when the resources to support the core mission are spread thin, and that several core activities appear to be fragile in places. Furthermore, the real customer and the understanding of how the customer uses climate information are not well defined and understood. This is an example of expanding to perceived mission without consideration of the end-to-end resources and impacts on the existing, important capabilities.” Pg. 33.*

Given these findings, how does your proposal for a new Climate Service line office reconcile these concerns of NOAA's propensity for mission-creep? How does your proposal reconcile the findings that reorganization is not needed, but instead strategic planning and better management would be the appropriate way to pursue NOAA's efforts to provide better climate services?

A4. Prior and subsequent reports to NOAA's Science Advisory Board, and reports from other major advisory panels such as the National Research Council, state the need for close association and integration of climate research, science and services. NOAA's historical mission to provide both climate science and service dates to the National Climate Program Act of 1975 and the U.S. Global Change Research Act (USGCRA) of 1990. Any proposal to establish a Climate Service in NOAA will be consistent with and advance the purposes of these legislative drivers.

NOAA has made significant progress in improving matrix management and strategic planning with respect to its climate enterprise. However in order to meet the current and future level of demand for climate services, the need for integrated execution of climate-related activities within a single line office has become apparent. An organizational change to enhance effectiveness across the agency is the purpose of our intent to organize a Climate Service Line Office in NOAA. NOAA has also completed a National Academy of Public Administration (NAPA) study to examine organizational options for a Climate Service within NOAA, as directed by the FY10 appropriations bill. The Panel, comprised of experts in government management and organizational change, also concluded that a new Line Office is the right organizational choice for a Climate Service in NOAA. NAPA's assessment of NOAA's matrix management is summarized in the following conclusion from the NAPA report:

“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. But based on its own assessments, and upon reviews from various outside bodies, NOAA and Department of Commerce leadership rightly concluded that the Climate Goal Team provided an incremental im-

provement, but that matrix management is not sufficient to meet current needs.”

In order to ensure NOAA uses its resources effectively as it responds to its legislative drivers, NOAA is currently developing a Vision and Strategic Framework document that recently completed a round of public comment. This document takes steps to define the short and long term scope of NOAA’s climate services. NOAA is actively engaging NOAA’s Science Advisory Board and the Climate Working Group on this plan to get input and feedback on the strategy and scope of the Climate Services.

NOAA’s intent to create a Climate Service is consistent with the recommendations of the reports listed below.

Barron, E. J. (Chair), et al., 2001: A Climate Services Vision: First Steps Toward the Future. Board on Atmospheric Sciences and Climate, National Research Council, Washington, DC.

Barron, E. J. (Chair), et al., 2009: Options for Developing a National Climate Service. Report to NOAA’s Science Advisory Board. 83 pages. http://www.sab.noaa.gov/Reports/2009/NCS_Report_FinaltoNOAA_6_5_09-1.pdf

Busalacchi, A. (Chair of Climate Working Group), Barron, E. J. (Chair of Review Team), et al., 2008: Final Report of the Review of the NOAA National Climate Services Strategy. Report to NOAA’s Science Advisory Board. 7 pages. http://www.sab.noaa.gov/Reports/2008/NOAA_SAB_CWG_NCS_Review_Sep08_FINALtoNOAA.pdf

Busalacchi, A. (Chair of Climate Working Group), et al., 2009: Climate Working Group (CWG) of NOAA’s Science Advisory Board Meeting Report for Fall 2009. Report to NOAA’s Science Advisory Board. 5 pages.

Corell, R. W., (Chair), et al., 2009: Informing Decisions In a Changing Climate. Panel on Strategies and Methods for Climate-Related Decision Support, Committee on the Human Dimensions of Global Change, Division of Behavioral and Social Sciences and Education, National Research Council. 198 pages

Miles E. L., A. K. Snover, L. C. Whitely Binder, E. S. Sarachik, P. W. Mote, and N. Mantua, 2006: An Approach to Designing a National Climate Service. *Proceedings of the National Academy of Sciences* **103**(25), 19616–19623. <http://www.pnas.org/cgi/doi/10.1073/pnas.0609090103>

Ramanathan, V. (Chair), et al., 2009: Restructuring Federal Climate Research to Meet the Challenges of Climate Change. Committee on Strategic Advice on the U.S. Climate Change Science Program; National Research Council. 178 pages

Q5. *Dr. Lubchenco, a number of reports completed in the last several years that suggest that an attempt to create a NOAA Climate Service line office is premature. There are still many outstanding questions about NOAA’s readiness to move forward with this agenda. Specifically, this knowledge base lacks sufficient information regarding who the customer is, how they use products, what products are available, who provides them, etc. Given this substantial “data gap” on the current state of climate services, what is the justification for moving forward?*

A5. [Note: It is unclear to NOAA which specific report or reports are referenced in this question]

Until now, individuals, communities, governments and industry have relied on what we know about the climate in the past to make important decisions about our systems and infrastructure—from agriculture to energy to transportation. In order to be successful and competitive in a changing climate, people need information and data about expected future conditions so they can make smart choices for their families and businesses. NOAA is responding to the growing demand from all sectors for more relevant, reliable information about the future state of the climate to allow better planning. The increased demand clearly demonstrates the need for coordinated, more accessible, user-driven climate information and services.

Numerous external studies, by NOAA’s Science Advisory Board, the National Academy of Sciences and others, have reiterated the need for easy-to-find, reliable and understandable information and products about climate change. In addition, the National Academy of Public Administration Panel strongly emphasized that there is a strong business case, user demand, and level of preparedness within NOAA to act now in establishing NOAA’s Climate Service.

NOAA, through its current climate and weather enterprises has significant experience working with users and providers of environmental information to understand their needs and capabilities with respect to products, data, and services. In

addition, NOAA strongly believes that a two-way communication with users and service developers (including researchers) is a critical part of any Climate Service.

NOAA uses multiple ways of tracking information regarding who the customer is, how they use products, what products are available, and who provides them. For example, through the National Climatic Data Center (NCDC; www.ncdc.noaa.gov), information on types of customers, how they use products and services, and the number of web hits for each product is tracked. Additionally, information on the economic and social benefits of NOAA data and products are available. NOAA-sponsored Regional Climate Centers (RCC) provide a number of regional-based climate products and services which are described on their web-site (e.g. <http://www.wrcc.dri.edu>). The NOAA sponsored Regional Integrated Sciences and Assessments (RISA) program works with regional users and stakeholders in a research capacity to understand climate-related needs and develop prototype climate information, products and services (http://www.climate.noaa.gov/cpo_pa/risa/). The NOAA sponsored International Research Institute for Climate and Society at Columbia University uses a science-based approach to enhance society's ability to understand, anticipate and manage climate risk in order to improve human welfare (www.iri.columbia.edu).

A Climate Service in NOAA would increase NOAA's ability to anticipate, understand and provide the information users need to address the challenge of climate change. Creating one office would create a stronger position for climate leadership within NOAA to more deliberately guide all climate research, monitoring and assessment work in a coordinated fashion.

Q6. In response to several questions about this new Climate Service, the NOAA website has posted a number of answers. It states, "The FY 2011 increases for climate included in NOAA's budget will contribute to the development and growth of the new NOAA Climate Service. These increases were chosen by NOAA, the Department of Commerce, and the Office of Management and Budget with an eye towards enhancing NOAA's climate science and service capabilities, most of which would be housed in the NOAA Climate Service. FY 2011 climate increases total \$130M, which includes \$47M that would support activities in the NOAA Climate Service."

What happens to this funding if NOAA does not receive the Congressional approval that is necessary to move forward with this proposal?

A6. In FY 2011, NOAA requested approximately \$47 million (not counting requests for remote sensing assets) that would support NOAA climate science and service activities. These increases include:

- \$10 million for Assessment Services to establish a new sustained capability within NOAA to provide climate assessments to decision-makers at national and regional scales;
- \$1.5 million for NOAA's Climate Portal to establish one-stop public access to all of NOAA's climate data, information, and services online;
- \$15.8 million to support critical climate observing infrastructure;
- \$6.98 million for 'Earth System Modeling: Urgent Climate Issues' will improve model resolutions and address critical areas of model uncertainty, including sea-level rise, Arctic, and terrestrial carbon cycle and biogeochemical feedbacks, and decadal predictions/abrupt change;
- \$11 million to expand the development of climate quality data records from satellite observations;
- \$2 million to enhance data center operations to provide users with consistent and reliable access to the Nation's environmental data and information via the Comprehensive Large Array-data Stewardship System.

The plans to establish NOAA's Climate Service would create a stronger position for climate leadership within NOAA to more deliberately guide all climate research, monitoring, and assessment work in an integrated fashion and to better coordinate efforts with its partners to ensure reliable delivery of climate services and information. If Congressional approval is not received for Climate Service Line Office, the requested increases will remain but will be executed within the respective line offices from which they were requested. These increases will continue to support NOAA's mandate to monitor and provide access to climate data and information, as well as address national priorities for climate identified by the U.S. Global Climate Change Research Program.

Q7. On February 1st, the Office of Science and Technology Policy (OSTP) announced a radical shift in our nation's weather satellite program by dissolving the tri-agency NPOESS program between NOAA, NASA, and DOD.

a. Was this decision made by the three agencies? Or was it made by OSTP?

A7a. The decision to restructure the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program was made by the Executive Office of the President after several months of discussion and deliberation and after receiving input from the Office of Science and Technology Policy, the Office of Management and Budget, and the National Security Council; and representatives from Department of Commerce/National Oceanic and Atmospheric Administration, Department of Defense, and National Aeronautics and Space Administration.

b. There was very little information accompanying the announcement on the dissolution of the NPOESS tri-agency program. It is assumed that the decision was made to lower the risk of the program and to be cost effective.

b(i)(a). Was there a comparison of what it would cost to keep the program together, but move the whole thing (procurement, management, etc.) to either DOD or NASA?

A7b(i)(a). Yes. The decision to restructure the NPOESS program was based on an analysis of various alternatives. A comparison was conducted and presented to the Executive Office of the President for consideration. Both DOD and NOAA/NASA provided their estimates for taking on the NPOESS program in its entirety under a single acquisition authority. However, this option did not address or mitigate the underlying factors contributing to schedule risk and cost growth that the NPOESS program was experiencing. In the end, restructuring the acquisition responsibilities by placing agencies in charge of specific orbits was the option that best positioned the program for success, including allowing improved agency management of technical, schedule, and cost risks.

b(i)(b). Was this comparison judged against the decision that was ultimately made?

A7b(i)(b). Yes. Restructuring the acquisition responsibilities by placing agencies in charge of specific orbits was the option that best addressed the management challenges that were contributing to the technical and schedule risk, and cost growth that the the NPOESS program faced.

b(i)(c). Please provide the Committee with the costs estimates of these options and reasons for taking the path you chose versus the others.

A7b(i)(c). The Joint Polar Satellite System (JPSS) program budget is being planned at a high confidence level. The JPSS program is assessing, tracking and mitigating, as practical, residual risks associated with program components already in development. Decisions on JPSS spacecraft and payload are focused on assuring continuity of data to meet critical national requirements to support weather forecasting, environmental monitoring and climate assessment. The JPSS program will be subject to independent review of mission concepts, organizational structure, acquisition strategies, and budget prior to program baseline.

The primary options that were reviewed were:

- Status quo (Tri-agency NPOESS program, as it was structured)
- Single agency (DoD or NOAA responsible for the entire NPOESS program)
- Divided responsibility (i.e., the February 1, 2010 decision)

Data continuity was the primary driver for the decision to restructure the program and each option was evaluated against how well it addressed cost, schedule, and technical risk. Underlying the assessment were the basic management tenants of:

- Aligning the development with an acquisition center
- Developing budgets at the 80 percent cost confidence
- Clear authority, responsibility, and accountability

The divided responsibility (i.e., the February 1, 2010 decision) provided the best solution.

b(ii). How is the tri-agency program going to be dissolved?

A7b(ii). A transition team has been formed to manage the activities of transitioning the NPOESS Program to the JPSS Program. This team includes representatives from NOAA, NASA and DOD. DOD issued Acquisition Decision Memo-

randa on March 27, May 10, June 22, and August 13, 2010, directing the NPOESS Program Executive Officer to transition the NPOESS activities to NOAA's JPSS and DOD's Defense Weather Satellite System (DWSS); these activities are underway. Additionally, NOAA and NASA have signed a Memorandum of Understanding to begin transition activities. The Executive Office of the President submitted a JPSS Implementation Plan to the Congress pursuant to the National Defense Authorization Act of 2010. On June 28, 2010, the President issued the National Space Policy for the United States of America, in which it charges the Secretary of Commerce, through the NOAA Administrator, the Secretary of Defense, through the Secretary of the Air Force, and the NASA Administrator to work together and with their international partners to ensure uninterrupted, operational polar-orbiting environmental satellite observations. It further states that the Secretary of Defense shall be responsible for the morning orbit, and the Secretary of Commerce shall be responsible for the afternoon orbit. The departments shall continue to partner in developing and fielding a shared ground system, with the coordinated programs operated by NOAA. Further, the departments shall ensure the continued full sharing of data from all systems. The Administration has determined that this policy supersedes the 1994 Presidential Decision Directive that established the NPOESS program. Finally, NOAA's FY 2011 Budget request of \$1.060 billion for JPSS would implement the NOAA portion of the restructured program to address the risk of a break in satellite data continuity in the afternoon orbit.

b(iii). DOD has enough legacy satellites to get them to 2020, possibly even to 2025. Do you think they will continue to use the NPOESS platform as the basis of any new satellite program or will they develop a new system?

A7b(iii). DOD is conducting a study to evaluate their requirements and will follow that with an Analysis of Alternatives that will inform the decision on the follow-on platform which could include using the NPOESS platform or developing a new platform.

DoD's global mission is dependent on having access to polar-orbiting data from all three orbits: early morning, mid-morning, and afternoon. The decision to restructure the NPOESS program places DoD in charge of providing data in the early morning orbit. EUMETSAT's MetOp and NOAA's Polar-orbiting Operational Environmental Satellite currently provide data to DoD from their current and future mid-morning and afternoon orbits, respectively. The restructured NPOESS directive would reciprocate NOAA access to DoD data in the early morning orbit.

b(iv). How does splitting the program reduce the risk? What is the current risk of project failure?

A7b(iv). Based on the review conducted by an Executive Office of the President Task Force and informed by recommendations from the NPOESS Independent Review Team and the Government Accountability Office (GAO), the Administration recognized the critical effect that would have resulted if the NPOESS program would have continued under the current management structure, and, consistent with the conclusions of independent reviewers, determined that if the NPOESS program was not restructured NOAA's ability to provide weather and climate data for the Nation was at significant risk.

The improved management structure of the JPSS program will enable the program to move forward consistent with NOAA's objectives in a more effective and efficient manner in the long term. Specifically, the restructured program will place NOAA and the Department of Defense (DOD) in charge of separate orbits. NOAA will be in charge of the afternoon orbit and will use the National Aeronautics and Space Administration (NASA) as its acquisition agent, on a reimbursable basis. DOD will be in charge of the morning orbit and will develop its own acquisition processes. This change will allow NOAA to exert more control over setting the pace of work that is required to develop the instruments and space and ground segments for the afternoon orbit. The restructured program also provides clear accountability, responsibility, and authority for each orbit, simplifying the decision-making processes that have caused significant delays in the NPOESS program. The restructure also provides infrastructure from acquisition centers that will support each acquisition with a strong team of technical and program personnel and rigorous, documented processes. In addition, the ability to utilize different sized spacecraft if necessary and to utilize international and commercial platforms will provide more flexibility to achieve improved continuity of observation.

NOAA faces a number of challenges that could contribute to risk of project failure, including the use of the FY 2011 funds to continue development of the instruments and ground system, and initiate JPSS transition activities. NOAA requires full funding of the President's FY 2011 budget to complete transition and fully imple-

ment JPSS in time to meet the 2014 launch readiness date to mitigate the possibility of a data gap in the afternoon orbit.

Q8. It is my understanding the DOD and NOAA will still utilize the new joint ground system and that information from the two different satellites will still be processed together.

a. How useful will this be if DOD maintains legacy instruments?

A8a. NOAA uses data from DOD legacy instruments in a variety of ways to support NOAA operations. NOAA anticipates continuing to use data from DOD instruments in the early morning orbit, whether they are legacy or advanced sensors. The JPSS ground system is currently scoped to accommodate data from the planned NPOESS development sensors, and accommodating legacy instruments is also well within the ground system capabilities. While operational legacy sensors fall short of NPOESS/JPSS sensor capabilities, even legacy observations from the early morning orbit would be a positive contribution to NOAA's operations. Having access to data from legacy and JPSS systems at the same time will allow for calibration and validation activities of the new data to occur in a measured and deliberate manner to support enhancement of numerical weather prediction models and climate models.

b. Doesn't this mean that we will only really be able to utilize legacy-level information from the new NOAA satellite since it has to be integrated with the DOD legacy information?

A8b. No. In fact, the JPSS ground system offers the agencies the opportunity to make operations more efficient by transitioning to a single enterprise solution for multiple satellites. NOAA has been studying this effort over the past year. The NPOESS designed ground system is well suited to incorporate legacy systems, if this is desired by the DOD in the future. NOAA will continue to support development of the new sensors and the information and products they will provide. NOAA's ground system network will support both legacy systems and JPSS satellites, as well as future DOD satellites. Additionally, NOAA is developing a high performance computing architecture and algorithms that can incorporate both legacy and JPSS data. This means that all sources of data will be utilized. Data from JPSS will be processed to achieve the planned (i.e., higher resolution than current operational data) sensor and environmental data products within the new joint JPSS ground system. The JPSS program will provide these data products to the DOD users for further exploitation in their operations. Both NOAA and DOD users have been planning for these data products from NPOESS, and should be well poised to reap the full benefits of the new NOAA satellite within their own operations. Toward that end, it is well worth noting that DOD technical experts are continuing to develop the infrastructure to integrate JPSS data into its product development. As the DOD's plans to implement its responsibilities under the restructured NPOESS program solidifies, NOAA intends to work with DOD in the same integrated manner for exploiting data from the DOD early morning orbit.

c. Wouldn't this make the entire upgrade a waste of money?

A8c. As noted above, NOAA's ground system network will support both legacy systems and JPSS satellites, and all sources of data will be utilized. The advanced observational capabilities planned for the JPSS satellites will provide significantly improved data that will benefit all users. More accurate data will support improved weather forecasts and alerts, and will further our understanding of climate to enable informed decisions to mitigate or adapt to climate change. There will be a period of time when NOAA will operate legacy satellites that are ending their useful life at the same time it will be operating the JPSS satellites. Having access to data from legacy and JPSS systems at the same time will allow for calibration and validation activities of the new data to occur in a measured and deliberate manner to support enhancement of numerical weather prediction models and climate models. The JPSS ground system allows us to implement an enterprise solution rather than the current stovepiped ground systems.

Q9. DOD is currently responsible for 50% of the cost of the tri-agency program.

a. Now that NOAA is going its own way, is it taking full responsibility for the cost of the ground system for which DOD would then pay NOAA to operate their half?

A9a. NOAA currently operates DOD's Defense Meteorological Satellite Program (DMSP) spacecraft on a reimbursable basis from the NOAA Satellite Operations Facility. NOAA will continue this arrangement for the DMSP satellites for the rest of

the program's life. If needed, NOAA will operate the satellites that form DOD's response to the restructured NPOESS program on a reimbursable basis.

b. Doesn't this put a greater burden on NOAA's budget if they are now responsible for all of the installed costs of the ground system, where before they were only be responsible for half?

A9b. No, the decision to place NOAA in charge of the JPSS ground system does not place a greater burden on NOAA. The President's FY2011 budget for JPSS provides adequate resources to support NOAA's efforts for complete development of the ground system which will be used by DOD and NOAA for both the morning and afternoon orbits. NOAA believes the challenges that remain to field and deploy the ground system are manageable.

Under JPSS, NOAA would need to have a ground system in place to support JPSS-1 and JPSS-2. Given the 2014 launch of JPSS-1, it is more cost-effective for NOAA to take the lead to continue development of the NPOESS ground system for its JPSS program. In fact, significant progress has occurred at the NOAA Satellite Operations Facility (NSOF) where command and control of the JPSS satellites will occur, and where NOAA currently operates DOD Defense Meteorological Satellite Program (DMSP) spacecraft on a reimbursable basis. Similarly, the network of SafetyNet sites that would support the acquisition of data from JPSS satellites has been identified and NOAA would gain more from leveraging that work instead of starting from scratch. With respect to providing data to DOD from the JPSS ground system, the technological adapters that would be required to do so would be relatively inexpensive to undertake.

Q10. Will the contract with Northrup Grumman be dissolved? How much will it cost the taxpayers for the termination of the contract?

A10. Termination and settlement costs are highly dependent on the decisions made by the transition teams, and it is premature to discuss changes to the contract until the transition team has completed its assessment of next steps. DoD is leading the Government's contract negotiations with the NPOESS prime contractor. Until the negotiations are complete, NOAA must retain funds to cover potential associated costs.

NOAA structured its FY 2011 budget request for JPSS to ensure that it could simultaneously address any contractual obligations that remain from the NPOESS program while implementing the decision to develop the JPSS program.

Q11. Do you have a plan in place to fix the many problems in the program in the event that Congress rejects the recommendation that this project be split up and chooses instead to fund it in the same manner as it has in the past?

A11. The review of the NPOESS program, led by the Executive Office of the President, evaluated many options, including modifying the tri-agency governance model. However, it was quickly recognized that the impediments to the NPOESS program's success were far more complex than the management structure issue alone.

NOAA's assessment of the challenges faced by the NPOESS program included:

- Challenges in harmonizing budget and costing methodologies across agencies upon which program life cycle costs and funding reserves were based.
- Differences in agency opinions for developing options to reduce and manage risk.
- Difficulties in aligning agency priorities and requirements to ensure program success.
- Cumbersome and ineffective overall program oversight and governance, and acquisition control, including the function of the NPOESS Executive Committee.

The Administration recommended restructuring the NPOESS program's acquisition satellite capabilities with the Nation's civil and military mission requirements and to continue the development of critical Earth observing instruments required for improving weather forecasts, climate monitoring, and warning lead times of severe storms. Informed by recommendations from the NPOESS Independent Review Team and the Government Accountability Office, the Administration recognized the critical effect that would have resulted if the NPOESS program would have continued under the current management structure, and, consistent with the conclusions of independent reviewers, determined that if the NPOESS program was not restructured NOAA's ability to provide weather and climate data for the Nation would be at risk.

The improved management structure of the JPSS program will enable the program to move forward consistent with NOAA's objectives in a more effective and efficient manner in the long term. Specifically, the restructured program will place NOAA and DOD in charge of separate orbits. NOAA will be in charge of the afternoon orbit and will use NASA as its acquisition agent, on a reimbursable basis. DOD will be in charge of the morning orbit and will develop its own acquisition processes. This change will allow NOAA to exert more control over the pace of work that is required to develop the instruments and space and ground segments for the afternoon orbit. The restructure provides clear accountability, responsibility, and authority for each orbit, simplifying the decision-making processes that have caused significant delays in the NPOESS program. The restructure also provides infrastructure from acquisition centers that will support each acquisition with a strong team of technical and program personnel and rigorous, documented processes. In addition, the ability to utilize different sized spacecraft if necessary and to utilize international and commercial platforms will provide more flexibility to achieve improved continuity of observation. In order to minimize the potential of a gap in the afternoon orbit, NOAA requires full funding of the President's FY 2011 budget request of \$1.06 billion.

Questions submitted by Representative Vernon J. Ehlers

Q1. I have long been concerned about the equity of NOAA's spending in the Great Lakes, when compared across NOAA's regions. If NOAA were to distribute regional funds equitably among NOAA's eight regions, the Great Lakes regions would receive about 13% of those funds. However, the Great Lakes region has only received two to three percent of those funds in 2008, 2009, and 2010. Is NOAA concerned by this lack of regional equity, and if so, please provide an explanation of how NOAA will address this regional inequity.

A1. NOAA considers the Great Lakes region to be equally important to other regions, and as such, NOAA supports critical activities in the Great Lakes, including local weather forecasts and warnings, research with local applications through the Sea Grant College Programs, monitoring contaminants as part of the National Status and Trends Mussel Watch Program, managing the Great Lakes coastal zone through the Coastal Zone Management Program, and developing ecological forecasting capabilities for the Great Lakes ecosystem through the Great Lakes Environmental Research Lab.

In FY 2011, NOAA expects a level of about \$78 million to continue activities in the Great Lakes region. This includes a request of \$65 million to sustain a base level of investment, plus we estimate approximately \$13 million in additional funds will be applied to projects in the Great Lakes region through multiple competitive grant programs. This amount does not include funding, approximately \$30 million, provided by the Environmental Protection Agency for the Great Lakes Restoration Initiative.

Q2. NOAA manages several competitive grant programs. While I support the competitive process, the process itself can sometimes direct the outcome in different directions. NOAA chooses well-qualified experts to participate in the peer review process. However, NOAA's ocean focus means that many times, requests for proposals themselves either do not embrace Great Lakes issues and/or review panels have little or no Great Lakes representation. Is there a way for NOAA to consider a separate competition for Great Lakes and freshwater issues or at least populate the review panels equitably with Great Lakes and freshwater experts?

A2. Several NOAA programs currently fund competitive grants that address Great Lakes issues, including Sea Grant, the Climate Program Office, the Integrated Ocean Observing System program, the Center for Sponsored Coastal Ocean Research, and the Coastal and Estuarine Land Conservation Program. Three large FY 2010 budget initiatives—the Invasive Species Regional Strategic Investment, Aquaculture Extension, and Aquaculture Research—will be soliciting grant proposals which will explicitly mention the Great Lakes region in the announcement language. For all NOAA competitive grant programs, when proposals are submitted from the Great Lakes, appropriate experts are included for both review panels.

In addition to NOAA funds, in FY 2010, NOAA is receiving approximately \$29.7 million of Environmental Protection Agency's (EPA) Great Lakes Restoration Initiative (GLRI) funding which will fund habitat restoration, invasive species, nearshore health, accountability, monitoring, and evaluation efforts in the Great Lakes. NOAA plans to participate in the multi-agency Great Lakes Multi-Year Restoration Action Plan. The EPA is requesting an additional \$300 million for GLRI in FY 2011 for

continued efforts. NOAA is committed to continuing the work of the GLRI. There are now many specific opportunities for federal research dollars to reach the Great Lakes region through this large interagency effort and the associated competitive programs.

In addition to program grants and GLRI funding, NOAA recently awarded a multi-year competitive grant for the Cooperative Institute for Limnology and Ecosystems Research (CILER), co-located at the University of Michigan and NOAA's Great Lakes Environmental Research Laboratory. CILER leverages both NOAA and University of Michigan personnel in Great Lakes research.

In FY 2011, NOAA expects a level of about \$78 million to continue activities in the Great Lakes region: \$65 million to sustain a base level of investment and approximately \$13 million in additional funds through multiple competitive grant programs. This amount does not include funding provided by the EPA for the Great Lakes Restoration Initiative.

NOAA appreciates the concerns raised and will continue to work to emphasize Great Lakes issues in national level competitions, as well as to ensure that competitive review panels include Great Lakes experts when appropriate. NOAA is working internally and externally through the NOAA Great Lakes Regional Collaboration Team to develop strategies to incorporate specific references to NOAA's freshwater, interior coasts and navigation, regional climate, and resource management missions in future grant solicitations.

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