AN OVERVIEW OF THE BUDGET PROPOSAL FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION FOR FISCAL YEAR 2017

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

March 16, 2016

Serial No. 114–67

Printed for the use of the Committee on Science, Space, and Technology

Available via the World Wide Web: http://science.house.gov

U.S. GOVERNMENT PUBLISHING OFFICE

20–837PDF WASHINGTON : 2017

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HON. LAMAR S. SMITH, Texas, *Chair*

FRANK D. LUCAS, Oklahoma
F. JAMES SENSENBRENNER, JR., Wisconsin
DANA ROHRABACHER, California
RANDY NEUGEBAUER, Texas
MICHAEL T. MCCAUL, Texas
MO BROOKS, Alabama
RANDY HULTGREN, Illinois
BILL POSEY, Florida
THOMAS MASSIE, Kentucky
JIM BRIDENSTINE, Oklahoma
RANDY K. WEBER, Texas
JOHN R. MOOLENAAR, Michigan
STEVE KNIGHT, California
BRIAN BABIN, Texas
BRUCE WESTERMAN, Arkansas
BARBARA COMSTOCK, Virginia
GARY PALMER, Alabama
BARRY LOUDERMILK, Georgia
RALPH LEE ABRAHAM, Louisiana
DARIN LAHOOD, Illinois
EDDIE BERNICE JOHNSON, Texas
ZOE LOFGREN, California
DANIEL LIPINSKI, Illinois
DONNA F. EDWARDS, Maryland
SUZANNE BONAMICI, Oregon
ERIC SWALWELL, California
ALAN GRAYSON, Florida
AMI BERA, California
ELIZABETH H. ESTY, Connecticut
MARC A. VEASEY, Texas
KATHERINE M. CLARK, Massachusetts
DON S. BEYER, JR., Virginia
ED PERLMUTTER, Colorado
PAUL TONKO, New York
MARK TAKANO, California
BILL FOSTER, Illinois

SUBCOMMITTEE ON ENVIRONMENT

HON. JIM BRIDENSTINE, Oklahoma, *Chair*

F. JAMES SENSENBRENNER, JR.
RANDY NEUGEBAUER, Texas
RANDY WEBER, Texas
JOHN MOOLENAAR, Michigan
BRIAN BABIN, Texas
BRUCE WESTERMAN, Arkansas
GARY PALMER, Alabama
RALPH LEE ABRAHAM, Louisiana
SUZANNE BONAMICI, Oregon
DONNA F. EDWARDS, Maryland
ALAN GRAYSON, Florida
AMI BERA, California
MARK TAKANO, California
BILL FOSTER, Illinois
EDDIE BERNICE JOHNSON, Texas

CONTENTS

March 16, 2016

AN OVERVIEW OF THE BUDGET PROPOSAL FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION FOR FISCAL YEAR 2017

WEDNESDAY, MARCH 16, 2016

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to call, at 2:04 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Jim Bridenstine [Chairman of the Subcommittee] presiding.

LAMAR S. SMITH, Texas
CHAIRMAN

EDDIE BERNICE JOHNSON, Texas
RANKING MEMBER

Congress of the United States
House of Representatives
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6301
(202) 225-6371
www.science.house.gov

Subcommittee on Environment

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Wednesday, March 16, 2016
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building

Witnesses

The Honorable Kathryn Sullivan, Undersecretary for Oceans and Atmosphere, U.S. Department of Commerce, and Administrator, National Oceanic and Atmospheric Administration

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENVIRONMENT

HEARING CHARTER

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Wednesday, March 16, 2016
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building

Purpose

The Subcommittee on Environment will hold a hearing entitled *An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017*, on Wednesday, March 16, 2016, in Room 2318 of the Rayburn House Office Building. The purpose of the hearing is to examine the Administration's Fiscal Year 2017 budget request for the National Oceanic and Atmospheric Administration (NOAA).

Witness List

- **The Honorable Kathryn Sullivan,** Undersecretary for Oceans and Atmosphere, U.S. Department of Commerce, and Administrator, National Oceanic and Atmospheric Administration

Background

The President's fiscal year (FY) 2017 budget request for NOAA is $5.85 billion, a $77 million increase above the FY 2016 enacted levels.

NOAA's core mission and activities include weather forecasting, climate prediction, and management of fisheries, coastal and ocean resources, as well as cross-cutting research to support and advance these operational areas. NOAA carries out this mission through five major line offices:

- **National Ocean Service** (NOS), responsible for mapping and charting coastal areas and providing other navigation support services;
- **National Weather Service** (NWS), responsible for weather forecasts and warnings;
- **National Environmental Satellite, Data and Information Service** (NESDIS), responsible for development and operation of satellites that monitor and transmit data for weather forecasting, climate prediction, space weather forecasting, and earth and ocean science research;

- **Office of Oceanic and Atmospheric Research** (OAR), responsible for research in support of most NOAA missions including atmospheric, coastal, and oceanic sciences, climate and air quality research, ecosystem research, and fisheries and marine mammal research; and
- **National Marine Fisheries Service** (NMFS), responsible for stewardship of living marine resources through the conservation, management, and promotion of healthy ecosystems.

Table 1 shows the primary accounts or line offices of NOAA's budget.

Table 1: NOAA FY 2017 Budget Request (dollars in millions)

Account	FY15 Spend Plan	FY16 Enacted	FY17 Request	FY17 Request versus FY16 Enacted	
	$M	$M	$M	$M	% change
National Ocean Service	535.7	601.8	569.9	-31.9	-5.3
Oceanic and Atmospheric Research	446.3	481.9	519.8	37.9	7.9
National Weather Service	1,087.5	1,124.1	1,119.3	-4.8	-0.4
National Environmental Satellite Data Information Service	2,223.1	2,349.4	2,303.7	-45.7	-1.9
National Marine Fisheries Service	958.2	971.7	1,015.9	44.2	4.5
Mission Support	247.9	253.9	286.1	32.2	12.9
Office of Marine and Aviation Operations	242.8	334.2	289.3	-44.9	-13.4
Totals:	**5,448.9**	**5,773.5**	**5,850.6**	**77.1**	**1.3**

National Weather Service (NWS)

NWS provides weather, hydrologic, and climate forecasts and warnings for the United States, adjacent waters, and ocean areas, and maintains a national infrastructure of observing systems that gather and process data worldwide from the land, sea, and air. The FY 2017 request for NWS is $1.1 billion, a decrease of $4.8 million below FY 2016 levels.

The proposal includes support to develop and operate the Nation's first Integrated Water Prediction capability, which will deliver water forecasts and products to stakeholders such as emergency managers and local decision makers. The request also supports increases for the Nation's surface weather observing network and extends the life of radar systems that predict weather.

National Environmental Satellite, Data, and Information Service (NESDIS)

The President's budget request for the National Environmental Satellite, Data, and Information Service (NESDIS) is $2.3 billion, a $45 million decrease over FY 2016 enacted levels. The majority of this request is for procurement and acquisition of two satellite programs, the Joint Polar Satellite System (JPSS) and the Geostationary Operational Environmental Satellite R-Series (GOES-R), which are nearing anticipated launch schedules. The request also supports the Polar Follow On program, which will extend the Agency's polar satellite orbit through the 2030s.

Oceanic and Atmospheric Research (OAR)

The Office of Oceanic and Atmospheric Research (OAR) is the primary research arm of NOAA, conducting the scientific research, environmental studies, and technology development necessary to improve NOAA operations. OAR activities are carried out at NOAA and via extramural research activities at thirty National Sea Grant colleges and universities. The Administration's FY 2017 budget request for OAR is $519.8 million, a $37.9 million increase above the FY 2016 level. The request supports climate, weather, and ocean research within the Agency. The request also supports a new research transition acceleration program to translate promising research into operational use.

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 that interface with Global Positioning Systems (GPS) to enhance the safety and efficiency of navigation of U.S. waterways. The President's FY 2017 request of $569.9 million would decrease overall funding for NOS programs by $31.9 million over the FY 2016 enacted level.

Mission Support

The Mission Support line office (previously called "Program Support") supports corporate services and agency management. This includes the office of the Under Secretary, the Office of the Chief Financial Officer, the Program, Planning and Integration Office, and the NOAA Education Program. Overall, the Administration requests a total of $286 million for the Mission Support account, a $32.2 million increase over the FY 2016 enacted level.

Office of Marine and Aviation Operations (OMAO)

The Office of Marine and Aviation Operations (OMAO maintains the ships and aircraft used by NOAA to gather and collect oceanographic, atmospheric, hydrographic, and fisheries data which supports NOAA's core missions. The Administration's FY 2017 budget request for OMAO is $289.3 million, a $44.9 million decrease over FY 2016 levels.

Chairman BRIDENSTINE. The Subcommittee on Environment will come to order.

Without objection, the Chair is authorized to declare recesses of the Subcommittee at any time.

Welcome to today's hearing titled "An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017."

I recognize myself for five minutes for an opening statement.

I want to thank our witness, Dr. Sullivan, for appearing today before us to talk about the National Oceanic and Atmospheric Administration's fiscal year 2017 budget request.

As a Representative from Oklahoma, a state hit regularly with severe weather, it is my responsibility to my constituents to promote policies that improve our forecasting abilities in order to save lives and property. My constituents, and the American people, deserve nothing less.

So I want to say that I am encouraged to see that NOAA has begun to utilize the growing opportunities that can bring a paradigm shift to the weather prediction landscape. This year's budget has a number of initiatives that I support.

First, the budget requests an increase to the Office of Space Commerce. This office will be the place where private-sector companies interact with NOAA through requests for information, proposals, data buys, and other partnerships. A properly staffed and funded office where the private sector can engage with NOAA is a vital component in a changing forecasting paradigm.

Second, I was pleased to see NOAA request funding to continue the Commercial Weather Data Pilot Program authorized by H.R. 1561, the Weather Research and Forecasting Innovation Act. This pilot program is an important signal to the private sector that NOAA is interested in new and innovative sources of data. Yesterday, we received the statutorily required report from NOAA detailing how the pilot program will be implemented, and I look forward to discussing that more during my questions.

Third, I am encouraged to see NOAA incorporate a line item for the purchase of radio occultation data as a potential alternative to another constellation of COSMIC satellites. This Committee has conducted several years of oversight on various weather data sources and technologies, and we have found that GPS–RO is a very promising technology that has the potential to revolutionize our forecasts.

I do have some concerns. Before any private-sector providers can engage with NOAA, it must lay out how these processes will work. NOAA released its Commercial Space Policy in January, a document laying out in very broad strokes how NOAA will utilize data acquisitions and other products from commercial companies. This policy was supposed to be quickly followed by a more specific process guide from NESDIS. We haven't seen that document yet.

Finally, the budget request language for radio occultation data acquisition seems to call for the purchase of commercial data only if NOAA fails to acquire data internally first, meaning through the owning and operating of a government satellite constellations. In budget language and staff meetings, it does not appear that NOAA is fully considering all the alternative sources. I disagree if this is

the strategy. Private providers have already launched some GPS–RO satellites, and others have plans to launch this year and next. NOAA should consider this option on an equal playing field, not only after exhausting all other options. Private-sector companies could improve our forecasting capabilities while also reducing the risk of a gap in our satellite data, an issue that has loomed over the agency for years.

In the absence of action from NOAA, the House of Representatives continues to work with our Senate counterparts to bring H.R. 1561 to the finish line. This is bipartisan legislation which will statutorily compel NOAA to consider commercial data to augment our currently fragile satellite systems in orbit. This bill will also increase NOAA's ability to conduct cutting-edge weather research needed to move to a day where there are zero deaths from tornados in this country.

I look forward to discussing these issues and more today.

[The prepared statement of Chairman Bridenstine follows:]

COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Lamar Smith, Chairman

For Immediate Release
March 16, 2016

Media Contact: Zachary Kurz
(202) 225-6371

Statement of Environment Subcommittee Chairman Jim Bridenstine (R-Okla.)
An Overview of the Budget Request for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Chairman Bridenstine: I want to thank our witness, Dr. Sullivan, for appearing today before us to talk about the National Oceanic and Atmospheric Administration's FY 2017 Budget Request.

As a representative from Oklahoma, a state hit regularly with severe weather, it is my responsibility to my constituents to promote policies that improve our forecasting abilities in order to save lives and property. My constituents, and the American people, deserve nothing less.

So I want to say that I am encouraged to see NOAA begin to utilize the growing opportunities that can bring a paradigm shift to the weather prediction landscape. This year's budget has a number of initiatives that I support.

First, the budget requests an increase to the Office of Space Commerce. This office will be the place where private sector companies interact with NOAA through requests for information, proposals, data buys, and other partnerships. A properly staffed and funded office where the private sector can engage with NOAA is a vital component in a changing forecasting paradigm.

Second, I was pleased to see NOAA request funding to continue the Commercial Weather Data Pilot program authorized by H.R. 1561, the Weather Research and Forecasting Innovation Act. This pilot program is an important signal to the private sector that NOAA is interested in new and innovative sources of data. Yesterday, we finally received the statutorily required report from NOAA detailing how the pilot program will be implemented, and I look forward to discussing that more during my questions.

Third, I am encouraged to see NOAA incorporate a line item for the purchase of radio occultation data as a potential alternative to another constellation of COSMIC satellites. This Committee has conducted several years of oversight on various weather data sources and technologies, and we have found that GPS-RO is a very promising technology that has the potential to revolutionize our forecasts.

However, I have some concerns. Before any private sector providers can engage with NOAA, it must lay out how these processes will work. NOAA released its Commercial Space Policy in January; a document laying out in very broad strokes how NOAA will utilize data acquisitions and other products from commercial companies. This policy was supposed to be quickly followed by a more specific process guide from NESDIS. We have yet to see that document.

Finally, the budget request language for radio occultation data acquisition seems to call for the purchase of commercial data only if NOAA fails to acquire data internally first – meaning, through the owning and operating of a government satellite constellation. In budget language and staff meetings, it does not appear that NOAA actually has any intention to truly consider alternative sources.

I fundamentally disagree with this strategy. Private providers have already launched some GPS-RO satellites, and others have plans to launch this year and next. NOAA should consider this option on an equal playing field, not only after exhausting all other options.

Private sector companies could improve our forecasting capabilities while also reducing the risk of a gap in our satellite data, an issue that has loomed over the Agency's head for years.

In the absence of action from NOAA, the House of Representatives continues to work with our Senate counterparts to bring H.R. 1561 to the finish line. This is bipartisan legislation which will statutorily compel NOAA to consider commercial data to augment our currently fragile satellite systems in orbit. This bill will also increase NOAA's ability to conduct cutting edge weather research needed to move to a day where there are zero deaths from tornados in this country.

I look forward to discussing these issues and more today. I yield back and recognize the Gentlewoman from Oregon, the ranking member, Ms. Bonamici.

###

Chairman BRIDENSTINE. I yield back, and I recognize the gentlewoman from Oregon, the Ranking Member, Ms. Bonamici.

Ms. BONAMICI. Thank you very much, Mr. Chairman, for holding this afternoon's hearing, and welcome back, Dr. Sullivan, and thank you for your service to the National Oceanic and Atmospheric Administration and to our country.

I'm looking forward to today's discussion about the President's fiscal year 2017 budget request and NOAA's priorities in the coming year.

NOAA is a critically important agency tasked with helping our communities, our economy, and our ecosystems remain healthy and resilient in the face of an ever-shifting environment. NOAA conducts state-of-the-art research to understand and predict changes in weather and the climate, as well as in the oceans and our coasts. This science is used to create products and services that inform decision-making by a diverse set of stakeholders, including emergency managers, farmers, pilots, and utility operators. NOAA is an agency that has a direct effect on the livelihood of all of our constituents.

In Oregon, NOAA helps coastal residents decide when it's safe to go fishing and if the shellfish they are harvesting or buying for dinner are free from harmful algal blooms. Their work supports the wine industry in Yamhill County, for example, as they grow grapes that become Oregon's world-famous pinot noir. And NOAA assists people in Oregon, and across the country, in planning for and responding to extreme weather events and natural hazards like heavy precipitation, drought, earthquakes, and tsunami.

Overall, I am pleased that the President's budget request recognizes the importance of NOAA to the economic security of our Nation. The budget request also recognizes that NOAA's critical mission of science, service, and stewardship can only be accomplished through a robust observational infrastructure.

I'm interested in learning more today about the agency's progress in developing and launching the next generation of environmental satellites, its efforts to recapitalize an aging fleet of survey vessels, and NOAA's plans to speed the transition of cutting edge-research into operational use.

Earlier this month, Oregon became the first state to enact legislation that would eliminate the use of coal-fired power. The law requires that Oregon accomplish this goal by 2035 and that the State double it renewable energy production by 2040. Oregonians know that climate change is the biggest environmental challenge of our time and they want to lead the way as the Nation and world starts to shift to cleaner energy sources.

So I am especially pleased that the proposed budget recognizes the growing demand for climate data, especially at the regional level. The budget seeks to address this need for regional information and tools by expanding the Regional Integrated Sciences and Assessments program into an additional region and by serving—region and by serving new communities in regions where the program already exists.

The proposed budget also seeks to improve our understanding of ocean acidification and the effect ocean health and climate variability can have specifically on fish stocks, but also on our economy

at large. Many people fish for a living in Oregon, Washington, and other coastal communities, and this is something that's causing serious concern. In fact, regional fishery managers are considering a closure of Oregon and Washington ocean salmon fisheries north of Cape Falcon. The warming of the ocean has been devastating for salmon runs. The predictions for coho returns this year is half of last year's forecast.

This is a problem for our ocean economy. According to the World Bank, more than 350 million jobs globally are tied directly to our oceans. Fisheries alone represent $108 billion a year in trade. In the United States, 58 percent of the Nation's GDP, or $8.3 trillion is generated by the counties that are adjacent to our oceans and our Great Lakes.

Although I am generally pleased with the President's budget request for NOAA, I will mention a specific concern. The Cascadia Subduction Zone sits off the coast of Oregon and off the northwest coast. It is not a matter of if but a matter of when another earthquake occurs, triggering a massive tsunami with potentially catastrophic results.

A researcher from Oregon State University, Dr. Chris Goldfinger, said "The gap between what we know and what we should do about it is getting bigger and bigger, and the action really needs to turn to responding. Otherwise, we're going to be hammered."

Therefore, I trust you will understand my concern with the proposed reduction of the education and awareness grants through the National Tsunami Hazard Mitigation Program. These grants are designed to help communicate threats to vulnerable communities and assist in the development of response strategies. We should not and we cannot neglect this critical last step.

Mr. Chairman, thank you, again for holding this hearing. I look forward to working with you and our colleagues to ensure that NOAA has the resources it needs to fulfill its missions of protecting life and property, and to getting some important legislation like the reauthorization of the Tsunami Warning, Education, and Research Act and the Weather Research and Forecasting Innovation Act signed into law.

I yield back the balance of my time.

[The prepared statement of Ms. Bonamici follows:]

Opening Statement
Ranking Member Suzanne Bonamici (D-OR) of the Subcommittee on Environment

Committee on Science, Space, & Technology
Subcommittee on Environment
"An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017"
March 16, 2016

Thank you, Mr. Chairman for holding this afternoon's hearing. Welcome back Dr. Sullivan, and thank you for your service and leadership at the National Oceanic and Atmospheric Administration. I'm looking forward to today's discussion about the President's fiscal year 2017 budget request and NOAA's priorities in the coming year.

NOAA is a critically important agency tasked with helping our communities, economy, and ecosystems remain healthy and resilient in the face of an ever-shifting environment. NOAA conducts state-of-the-art research to understand and predict changes in weather and the climate, as well as in the oceans and our coasts. This science is used to create products and services that inform decision-making by a diverse set of stakeholders, including emergency managers, farmers, pilots, and utility operators.

NOAA is an agency that has a direct effect on the livelihood of all of our constituents. In Oregon, NOAA helps coastal residents decide when it's safe to go fishing and if the shellfish they are harvesting or buying for dinner are free from harmful algal blooms. Their work supports the wine industry in Yamhill County as they grow grapes that become Oregon's world-famous pinot noir. And NOAA assists people in Oregon, and across the country, in planning for and responding to extreme weather events and natural hazards like heavy precipitation, drought, earthquakes, and tsunami.

Overall, I am pleased that the President's budget request recognizes the importance of NOAA to the economic security of our nation. The budget request also recognizes that NOAA's critical mission of "science, service, and stewardship" can only be accomplished through a robust observational infrastructure. I'm interested in learning more today about the agency's progress in developing and launching the next generation of environmental satellites, its efforts to

recapitalize an aging fleet of survey vessels, and NOAA's plans to speed the transition of cutting edge-research into operational use.

Earlier this month, Oregon became the first state to enact legislation that would eliminate the use of coal-fired power. The law requires that Oregon accomplish this goal by 2035 and that the State double it renewable energy production by 2040. Oregonians know that climate change is the biggest environmental challenge of our time and they want to lead the way as the nation and world starts to shift to cleaner energy sources.

So I am especially pleased that the proposed budget recognizes the growing demand for climate data, especially at the regional level. The budget seeks to address this need for regional information and tools by expanding the Regional Integrated Sciences and Assessments program into an additional region and by serving new communities in regions where the program already exists.

The proposed budget also seeks to improve our understanding of ocean acidification and the effect ocean health and climate variability can have specifically on fish stocks, but also on our economy at large.

Many people fish for a living in Oregon and Washington, and this is something that is causing serious concern. In fact, regional fishery managers are considering a closure of Oregon and Washington ocean salmon fisheries north of Cape Falcon. The warming of the ocean has been devastating for salmon runs, the predictions for coho returns this year is half of last year's forecast.

This is a problem for our ocean economy. According to the World Bank, more than 350 million jobs globally are tied directly to our oceans. Fisheries alone represent $108 billion dollars per year in trade. In the United States, 58 percent of the nation's gross domestic product or $8.3 trillion dollars is generated by the counties that are adjacent to our oceans and Great Lakes.

Although I am generally pleased with the President's budget request for NOAA, I will mention a specific concern. The Cascadia Subduction Zone sits off the coast of Oregon. It is not a matter

of if, but when another earthquake occurs on this fault-- triggering a massive tsunami with potentially catastrophic results.

A researcher from Oregon State University, Dr. Chris Goldfinger, was quoted stating that, "the gap between what we know and what we should do about it is getting bigger and bigger, and the action really needs to turn to responding. Otherwise, we're going to be hammered."

Therefore, I trust you will understand my concern with the proposed reduction of the education and awareness grants through the National Tsunami Hazard Mitigation Program. These grants are designed to help communicate threats to vulnerable communities and assist in the development of response strategies. We can't neglect this critical last step.

Mr. Chairman, thank you, again for holding this hearing. I look forward to working with you and our colleagues to ensure that NOAA has the resources it needs to fulfill its missions of protecting lives and property, and to getting some important legislation like the reauthorization of the Tsunami Warning, Education, and Research Act and the Weather Research and Forecasting Innovation Act signed into law. I yield back the balance of my time.

Chairman BRIDENSTINE. I'd like to thank the Ranking Member from Oregon, Ms. Bonamici, for her opening statement, and recognize the Chairman of the full Committee, Mr. Smith.

And before doing so, I'd like to note that everybody on the Republican side other than me is from Texas. I think this Committee is not sufficiently balanced appropriately for a guy from Oklahoma.

Mr. WEBER. Mr. Chairman, we will get you an application when this is over.

Chairman SMITH. Thank you, Mr. Chairman.

We are here to discuss the President's fiscal year 2017 budget request for the National Oceanic and Atmospheric Administration. This year, NOAA's request comes in at $5.8 billion.

While I support elements of NOAA's budget, other parts of the President's budget request cannot be justified. For example, the Administration's request continues to increase funding for climate research at the expense of other important areas of research. This administration continues to prioritize climate funding over weather research. The President's budget requests $190 million for climate research while only $100 million is dedicated to weather research. NOAA should fully fund weather research as authorized in the House-passed bipartisan Weather Research and Forecasting Innovation Act. It is NOAA's job to monitor the climate and disseminate data to the public.

But under this administration, this usually takes the form of monthly news releases that that fail to include all relevant data sources. For example, the agency often ignores satellite measurements, which are considered by many to be the most objective. NOAA and NASA both claimed, for example, that 2014 was the hottest year on record. However, scientists at NASA concluded that they were only 38 percent certain that 2014 was in fact the hottest on record. NASA buried this statistic in a footnote to their report.

Similarly, in 2015, NOAA and NASA's joint news release for the temperature of 2015 did not mention satellite data. However, a prominent satellite data set from the University of Alabama at Huntsville showed that 2015 was only the third warmest year on record and another widely used satellite dataset showed that 2015 was only the fourth warmest on record, contrary to NOAA's claims. The truth is that neither 2014 nor 2015 were the hottest year on record. Satellite data, which NOAA had access to, clearly refutes NOAA's claims.

Likewise, a recent report presented at the American Geophysical Union and coauthored by the Texas and Alabama state climatologists has called into question the placement and quality of many ground stations across the United States. The report concluded that this may have resulted in inaccurate temperature readings used by NOAA. Instead of hyping a climate change agenda, NOAA should focus its efforts on producing sound science and improving methods of data collection.

NOAA should prioritize areas of research that significantly impact Americans today, such as ways to improve weather forecasting. Unfortunately, climate alarmism often takes priority at NOAA. This was demonstrated by the agency's decision to prematurely publish the 2015 study that attempted to make the two-decade halt in global warming disappear. The study, led by NOAA

meteorologist Mr. Thomas Karl, used controversial new methods to readjust historical temperature data upward. The goal was clear from the start: remove a weakness in the administration's climate change agenda.

This Committee began an investigation last July to examine NOAA's use of data in this study as well as their role in carrying out the administration's extreme climate agenda. The Committee heard from whistleblowers that the study was rushed into publication and that internal debate was stifled before moving forward. Even more suspicious was the timing of this study. It was published just as the administration was about to propose its final Clean Power Plan regulation at the United Nations' Paris Climate Change Conference. This controversial study appears to serve only one purpose: to promote the Administration's drastic and costly regulations.

Well-respected scientists have recently rebutted NOAA's claims. A new peer-reviewed study, published in the journal Nature, confirms the halt in global warming. According to one of the study's lead authors, it "essentially refutes" NOAA's study. The media were quick to cover NOAA's study last year, by the way, but the many respected scientists who refuted NOAA's claims were ignored by much of the national media, including the very same outlets that had previously reported that there never was a halt in global warming.

To date, NOAA has failed to comply with a lawfully issued subpoena. Instead of devoting time and resources to misinform the public, NOAA should give the Committee answers to our valid questions. NOAA should adhere to the scientific standards of being objective, independent of political considerations, timely, and having findings based on all available sources of information. Instead, NOAA ignores legitimate sources of objective information, such as satellite data, in order to promote the administration's biased climate change agenda.

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

[The prepared statement of Chairman Smith follows:]

COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Lamar Smith, Chairman

For Immediate Release
March 16, 2016

Media Contact: Zachary Kurz
(202) 225-6371

Statement of Chairman Lamar Smith (R-Texas)

An Overview of the Budget Request for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Chairman Smith: Thank you, Chairman Bridenstine. We are here to discuss the President's Fiscal Year 2017 budget request for the National Oceanic and Atmospheric Administration (NOAA). This year, NOAA's request comes in at $5.8 billion. While I support elements of NOAA's budget, other parts of the President's budget request cannot be justified. For example, the administration's request continues to increase funding for climate research at the expense of other important areas of research.

This administration continues to prioritize climate funding over weather research. The president's budget requests $190 million for climate research while only $100 million is dedicated to weather research. NOAA should fully fund weather research as authorized in the House-passed bipartisan *Weather Research and Forecasting Innovation Act.*

It is NOAA's job to monitor the climate and disseminate data to the public. But under this administration, this usually takes the form of monthly news releases that that fail to include all relevant data sources. For example, the agency often ignores satellite measurements, which are considered by many to be the most objective.

NOAA and NASA both claimed, for example, that 2014 was the hottest year on record. However, scientists at NASA concluded that they were only 38 percent certain that 2014 was in fact the hottest on record. NASA buried this statistic in a footnote to their report. Similarly, in 2015, NOAA and NASA's joint news release for the temperature of 2015 did not mention satellite data.

However, a prominent satellite data set from the University of Alabama at Huntsville showed that 2015 was only the 3rd warmest year on record and another widely used satellite dataset (RSS) showed that 2015 was only the 4th warmest on record, contrary to NOAA's claims. The truth is that neither 2014 nor 2015 were the hottest year on record. Satellite data, which NOAA had access to, clearly refutes NOAA's claims.

Likewise, a recent report presented at the American Geophysical Union and coauthored by the Texas and Alabama State climatologists has called into question the placement and quality of many ground stations across the U.S. The report

concluded that this may have resulted in inaccurate temperature readings used by NOAA.

Instead of hyping a climate change agenda, NOAA should focus its efforts on producing sound science and improving methods of data collection. NOAA should prioritize areas of research that significantly impact Americans today, such as ways to improve weather forecasting. Unfortunately, climate alarmism often takes priority at NOAA. This was demonstrated by the agency's decision to prematurely publish the 2015 study that attempted to make the two-decade halt in global warming disappear.

The study, led by NOAA meteorologist Mr. Thomas Karl, used controversial new methods to readjust historical temperature data upward. The goal was clear from the start: remove a weakness in the administration's climate change agenda. This Committee began an investigation last July to examine NOAA's use of data in this study as well as their role in carrying out the administration's extreme climate agenda. The Committee heard from whistleblowers that the study was rushed into publication and that internal debate was stifled before moving forward.

Even more suspicious was the timing of this study. It was published just as the administration was about to propose its final Clean Power Plan regulation at the United Nation's Paris Climate Change Conference. This controversial study appears to serve only one purpose: to promote the administration's drastic and costly regulations.

Well-respected scientists have recently rebutted NOAA's claims. A new peer-reviewed study, published in the journal Nature, confirms the halt in global warming. According to one of the study's lead authors, it "essentially refutes" NOAA's study. The media were quick to cover NOAA's study last year. But the many well-respected scientists who refuted NOAA's claims were ignored by much of the national media, including the very same outlets that had previously reported that there never was a halt in global warming.

To date NOAA has failed to comply with a lawfully issued subpoena. Instead of devoting time and resources to misinform the public, NOAA should give the Committee answers to our valid questions. NOAA should adhere to the scientific standards of being objective, independent of political considerations, timely, and having findings based on all available sources of information.

Instead, NOAA ignores legitimate sources of objective information, such as satellite data, in order to promote the administration's biased climate change agenda. Thank you, Chairman Bridenstine, I yield back.

###

Chairman BRIDENSTINE. I'd like to thank the Chairman of the full Committee, Mr. Smith, for his opening comments.

I now recognize the Ranking Member of the full Committee, Ms. Johnson, for a statement.

Ms. JOHNSON. Thank you very much, Mr. Chairman, and I'd like to welcome Dr. Sullivan to the Committee, and thank you for being here today to testify.

As many of us know, NOAA's research and services play a critical role in weather forecasting, enhancing our understanding of the environment, and, ultimately in helping ensure that the United States' economy remains strong. A key aspect of those efforts is to work with NOAA does—is the work that NOAA does to help us understand and address the potential impacts associated with climate change. Rising temperatures and sea levels, and changes in ocean chemistry and ecosystems pose a real threat to public health, the management of our fisheries and coasts, and the overall resiliency of our communities to extreme weather changes and events. NOAA's programs and activities and the tools and information they provide are central to our ability to understand, adapt to, and mitigate the impacts of a changing climate.

The proposed budget request contains a number of programs and activities that will expand NOAA's capabilities and increase the resiliency of communities, but I'd like to comment on one new initiative that I find especially promising. NOAA is proposing to develop and operate the Nation's first integrated water prediction capability, meaning that NOAA wants to develop the ability to deliver street-level water forecasts to more than 100 million Americans. This level of detail and coverage could significantly improve our capacity to prepare for and respond to floods, droughts, and water-quality hazards.

Unfortunately, those of us from Texas have seen our fair share of both flooding and droughts over the last few years and I'm certain that our local emergency managers and decision makers would have welcomed this capability.

Overall, I am happy to see that the President's budget request for NOAA emphasizes the agency's critical roles in improving weather forecasts and in helping the United States act on climate change.

I look forward to discussing these efforts, as well as the other important initiatives and programs that are contained in NOAA's proposed budget.

Before I yield back, I'd like to address the Majority's ongoing investigation of NOAA's climate scientists. It is clear to me that this investigation is unfounded and that it is being driven by ideology and other agendas. The Majority has asserted, without offering any credible evidence, that NOAA and the climate science community, at large, are part of some grand conspiracy to falsify data in support of the significant role humans play in climate change. However, the overwhelming body of scientific evidence, across many different fields, has shown that this is not the case. There may be an ongoing scientific debate about the rate of warming over the last 15 years, but that does not change the basic facts according to science: the world is warming, the warming is caused mostly by humans, and there are significant risks associated with this warming.

I hope my friends and colleagues on the other side of the aisle can move past this effort to create scientific controversy where it does not exist and instead focus on finding solutions to addressing the threat of climate change.

I thank you, Mr. Chairman and I yield back the balance of my time.

[The prepared statement of Ms. Johnson follows:]

Opening Statement
Ranking Member Eddie Bernice Johnson (D-TX)

Committee on Science, Space, & Technology
Subcommittee on the Environment
"An Overview of the National Oceanic and Atmospheric Administration Budget Request for Fiscal Year 2017"
March 16, 2016

Thank you Mr. Chairman. I would also like to welcome Dr. Sullivan to the Committee and thank her for being here today to testify on NOAA's fiscal year 2017 budget request.

As many of us know, NOAA's research and services play a critical role in weather forecasting, enhancing our understanding of the environment and, ultimately in helping ensure that the United States' economy remains strong. A key aspect of those efforts is the work that NOAA does to help us understand and address the potential impacts associated with climate change.

Rising temperatures and sea levels and changes in ocean chemistry and ecosystems pose a real threat to public health, the management of our fisheries and coasts, and the overall resiliency of our communities to extreme weather events. NOAA's programs and activities and the tools and information they provide are central to our ability to understand, adapt to, and mitigate the impacts of a changing climate.

The proposed budget request contains a number of programs and activities that will expand NOAA's capabilities and increase the resiliency of communities, but I'd like to comment on one new initiative that I find especially promising.

NOAA is proposing to develop and operate the Nation's first integrated water prediction capability—meaning that NOAA wants to develop the ability to deliver street-level water forecasts to more than 100 million Americans. This level of detail and coverage could significantly improve our capacity to prepare for and respond to floods, droughts, and water-quality hazards. Unfortunately, those of us from Texas have seen our fair share of both flooding and droughts over the last few years and I'm certain that our local emergency managers and decision makers would have welcomed this capability.

Overall, I am happy to see that the President's budget request for NOAA emphasizes the agency's critical roles in improving weather forecasts and in helping the United States act on climate change.

I look forward to discussing these efforts, as well as the other important initiatives and programs that are contained in NOAA's proposed budget.

Before, I yield back I'd like to address the Majority's ongoing investigation of NOAA's climate scientists. It is clear to me that this investigation is unfounded and that it is being driven by

ideology and other agendas. The Majority has asserted, without offering any credible evidence, that NOAA and the climate science community, at-large, are part of some grand conspiracy to falsify data in support of the significant role humans play in climate change. However, the overwhelming body of scientific evidence, across many different fields has shown that this is not the case.

There may be an ongoing scientific debate about the rate of warming over the last 15 years, but that does not change the basic facts according to science: the world is warming, the warming is caused mostly by humans, and there are significant risks associated with this warming. I hope my friends and colleagues on the other side of the aisle can move past their efforts to create scientific controversy where it doesn't exist and instead focus on finding solutions to addressing the threat of climate change.

Thank you, Mr. Chairman and I yield back the balance of my time.

Chairman BRIDENSTINE. I'd like to thank the Ranking Member for her opening statement.

Our witness today is the Honorable Kathryn Sullivan, Undersecretary for Oceans and Atmosphere at the U.S. Department of Commerce, and Administrator of the National Oceanic and Atmospheric Administration.

Previously, Dr. Sullivan served as Assistant Secretary of Commerce for Environmental Observation and Prediction, as well as performing the duties of NOAA's Chief Scientist. She is a distinguished scientist, renowned astronaut, and intrepid explorer. Dr. Sullivan earned her doctorate in geology from Dalhousie University.

I now recognize Administrator Sullivan for five minutes to present her testimony.

TESTIMONY OF HON. KATHRYN SULLIVAN, UNDERSECRETARY FOR OCEANS AND ATMOSPHERE, U.S. DEPARTMENT OF COMMERCE, AND ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Ms. SULLIVAN. Thank you, Chairman Bridenstine, Ranking Member Bonamici, and members of the Subcommittee. I'm very pleased to be here today to discuss the President's fiscal year 2017 budget proposal for NOAA.

NOAA is one of the most valuable service agencies in the government. Americans rely upon our information and services every day, looking to our observations, forecasts and assessments for the foresight and the reliable information they need to live well and safely in this dynamic planet. The severe storms and flooding in the South over this past week remind us all just how vital these services are.

Our 2017 budget request of $5.9 billion builds on the foundation established with the support of Congress to put this critical information into the hands of the public. Each of the proposed increases is a carefully chosen, targeted investment designed to meet the growing demand for services. In my remarks today, I'll highlight just a few points.

First, this budget invests in the observational infrastructure needed to protect public safety and welfare. To produce the weather forecasts our citizens, military and the economy rely upon, we must ensure continuity of our satellite operations. The successful launches of DSCOVR and Jason-3 and the upcoming launches of GOES–R and JPSS–1 are major milestones in this regard. We appreciate Congress's support for the Polar Follow On program last year, and now request $393 million for PFO and next-gen technologies that set the stage for improved forecasts in the decades to come. We must also invest in the fleet of ships that provide critical ocean-observing capabilities. Without timely investment, our fleet will decline by 50 percent by 2028. We appreciate that $80 million Congress provided in the fiscal year 2016 Omnibus to begin recapitalization, and here request $24 million to complete design and construction of a regional survey vessel.

Second, this budget focuses on community resilience. 2015 saw ten United States weather and climate disaster events with losses of each one exceeding a billion dollars. Recognizing this enormous

impact, the budget invests in the services and information the communities need to assess their risks and minimize losses ahead of, during, and after such extreme events. And water is at the heart of many environmental threats. There's either too much or too little, it's in the wrong place, or it's of poor quality. NOAA is uniquely positioned to bring both new research insights and the operational predictions the Nation needs to address the water challenges ahead.

This budget includes $12.25 million to establish the Integrated Water Prediction initiative, the heart of which is an enhanced river flood forecast system that will increase the number of prediction points nationally 700 times from about 4,000 to nearly 2.7 million, making it possible for us to give street-level forecasts to 100 million Americans that lack them today.

Third, this budget makes investments that ensure our National Weather Services is second to none. Weather and climate impact approximately a third of the Nation's economy. They can cost billions of dollars and claim hundreds of lives per year. We remain firm in our commitment to build a weather-ready Nation and provide citizens with timely, accurate and well-communicated forecasts.

Our budget request includes funding to extend the operating life of two critical ground observing systems: the NEXRAD radar, which support about 85 percent of all tornado warnings, and ASOS, which is vital to aviation across the country. Extending the life of these critical systems for a fraction of the original cost is a wise investment.

Finally, the budget aims to improve the operational core of this agency. To meet these national needs and give our customers the best service possible, we must have an adequate mission support infrastructure. I believe instead we are near a critical breaking point. For example, funding for our HR services has declined steadily since 2008 but the workload has risen. A result is a backlog of 1,800 vacancies, and the level of churn in our human resources workforce is twice that of other agencies. We must act now, and this budget requests $4.4 million to address the most severe mission-support weaknesses.

Finally, transforming the R&D of our world-class scientists into tangible benefits for the country currently takes far too long. To speed this up, we've developed a Research Transition Acceleration program based on proven methods and best practices from NASA, the Defense Department, and the private sector, and propose to fund it at $10 million.

In sum, NOAA's fiscal year 2017 budget reflects our commitment to growing a strong economy that is built to last while being fiscally responsible and focusing on priority initiatives.

I thank you.

[The prepared statement of Ms. Sullivan follows:]

WRITTEN STATEMENT OF
KATHRYN SULLIVAN, PH.D.
UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE
AND NOAA ADMINISTRATOR
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

ON THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S
FY 2017 BUDGET REQUEST

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

March 16, 2016

Chairman Bridenstine, Ranking Member Bonamici, and members of the Subcommittee, thank you for this opportunity to discuss the Administration's Fiscal Year 2017 (FY17) Budget Request for the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). The priorities included in the FY17 Budget request build upon the important investments you enacted in FY16, and I am grateful for your support.

I believe that NOAA is one of the most valuable service agencies in the U.S. government. Through our network of observations, forecasts, and assessments, we strive to provide the foresight and information people need to live well and safely on this dynamic planet. At NOAA, we call this information "environmental intelligence," and producing it is at the core of our mission. From the surface of the sun to the depths of the ocean floor, we're keeping our finger on the pulse of our changing planet. We provide timely, reliable, and actionable information – based on sound science – that citizens, communities and businesses rely on to safeguard lives and property, prepare for extreme weather events, adapt to a changing world, ensure environmental sustainability, and enhance economic prosperity.

The $5.9 billion FY17 budget request is a $77 million increase over the FY 2016 enacted level and focuses on supporting our core missions, including deploying the next generation of weather satellites and observational infrastructure; fostering healthy marine resources; strengthening the

resiliency of our communities to adapt to a changing planet; improving forecasting accuracy and lead times for severe weather; and achieving organizational excellence by providing robust mission support services.

We've seen demand for our products and services increase as decision makers look for tools to help them better understand risk and prepare for the future. NOAA forecasts help communities prepare and respond to weather events, including the severe storms that swept through Texas last year, tornado events across the mid-west and Florida, and the recent winter storm that struck the Northeast. NOAA is also constantly improving its longer range forecasts for drought, coastal inundation and sea level rise, and seasonal events including El Ninos and La Ninas.

But the greater demand for our services goes beyond just extreme weather. The marine transportation system must accommodate a growing volume of commerce at our ports. NOAA provides the positioning data, tide and currents information, and nautical charts that ensure safe navigation and keep commerce flowing. Furthermore, changes in marine ecosystems due to climate and other stressors are increasing the need for more advanced scientific assessments to sustain economically viable commercial and recreational fisheries and to ensure that threatened and endangered species are protected.

The NOAA FY 2017 budget request aims not only to enhance public safety and community resilience, but also to make smart investments via innovative science and research to better position this country, its services, and its citizens for the future. As the agency positions itself to meet the growing demand from communities and businesses to help them prepare for, respond to, and overcome vulnerabilities and risk, we have carefully crafted a budget that continues efforts to strike a balance among our mission areas and between our internal and extramural programs, while maintaining strong fiscal discipline.

Below we highlight some of our top accomplishments, many of which we could not have achieved without strong support from Congress and our partners in the research, corporate, and conservation communities.

Launched Deep Space Climate Observatory Satellite (DSCOVR)
On February 11, 2015, we successfully launched DSCOVR from Cape Canaveral, Florida. DSCOVR, the United States' first operational deep space satellite, is a vital piece of our international space weather observing system. DSCOVR provides NOAA's Space Weather Prediction Center forecasters high-quality measurements of solar wind conditions, improving their ability to monitor and warn of potentially dangerous geomagnetic storms. Early warnings are crucial because solar storms can disrupt public infrastructure, such as transportation systems, power grids, telecommunications, and Geographic Positioning Systems (GPS). Early geomagnetic storm warnings allow infrastructure managers from the commercial airline, electric

power, and GPS industries to take appropriate mitigation actions. DSCOVR reached final orbit at Lagrange point 1, a gravity neutral point a million miles away from Earth, on June 8, 2015, and is now hovering continuously between the sun and Earth.

Launched the Jason-3 Satellite

On January 17, 2016, teams from NOAA, NASA, the Centre national d'etudes spatiales (CNES, the French Space Agency), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and SpaceX launched the Jason-3 satellite continuing a 20-year legacy of measuring changes to our world's oceans. From its near-polar orbit 1380 km above the earth, this observational platform will continue a record of ocean surface topography measurements. This sea level data is important for scientists to observe global sea level rise, help understand the strength of tropical cyclones, forecast tides and currents for commercial shipping, inform response efforts for oil spills and harmful algal blooms, and support El Nino and La Nina research and forecasting.

Continued Progress on Ending Overfishing and Rebuilding Fish Stocks

NOAA's *Status of Stocks 2014: Annual Report to Congress on the Status of U.S. Fisheries*, released in April 2015, reports that the number of fish stocks subject to overfishing or overfished has declined to an all-time low. As a result of the combined efforts of NOAA; the regional fishery management councils; and our partners in industry, research, and conservation communities; stocks subject to overfishing are down from 17 to 8 percent and overfished stocks are down from 24 to 16 percent since 2007. The report notes that three stocks, Gulf of Mexico gag grouper, golden tilefish, and butterfish, have been rebuilt to target levels. Two additional stocks, canary rockfish and petrale sole, have been rebuilt since the report was released, bringing the total to 39 stocks rebuilt since 2000 and allowing additional fishing opportunity in those fisheries. Gulf of Mexico red snapper continues to rebuild, enabling a 30 percent increase in the allowable catch for red snapper in 2015.

Led Effort to Secure Settlement Funds for Gulf of Mexico Ecosystem Restoration

NOAA led a collaborative effort among four Federal agencies and the five Gulf of Mexico states (Trustees) to advance the *Deepwater Horizon* oil spill case – the largest marine oil spill in U.S. history – to reach a groundbreaking proposed settlement between British Petroleum (BP) and the Trustees that will promote widespread restoration in the affected region. NOAA provided extensive science and research (assessing the fish, wildlife, and habitat affected by the spill), supported the litigation actions against BP and other responsible parties, and led development of a comprehensive damage assessment and restoration plan that will direct $8.8 billion for ecosystem restoration in the Gulf of Mexico in the coming years. This funding will support significant long-term restoration for natural resources injured by the oil spill, including sea turtles, marine mammals, fish, deep sea corals, oysters, and coastal habitats and will provide

lasting and significant benefits to the people and environment of the Gulf of Mexico who were most directly impacted by this tragic event.

Increased Supercomputing Capacity for Improved Data Assimilation and Forecasts
NOAA began a major upgrade of its large scale operational supercomputers to allow for greater data assimilation and faster computation of model data. The supercomputing upgrade will help forecasters more accurately predict droughts, floods, winter storms, severe thunderstorms, and hurricanes. It will also enhance our water science and services for better forecasts of water flow, soil moisture, evapotranspiration, runoff, and other parameters for 2.7 million stream reaches in the continental U.S. This upgrade has already increased NOAA's supercomputing capacity by nearly four times the previous level, for a total of 5.8 petaflops.

Expanded Two California National Marine Sanctuaries
On June 9, 2015, NOAA expanded two national marine sanctuaries (NMS) by 2,770 square miles to protect one of the most productive ocean areas in North America. The expansion represents a tremendous collaborative effort by local communities, academia and government, and is based on years of public comment and research by NOAA and its scientific partners. The nutrient rich upwelling zone identified in the Cordell Bank and Gulf of the Farallones NMS supports a vast array of sea life including whales, seals, dolphins, sea lions, and white sharks. New research opportunities in the expansion areas have already provided new findings, including the discovery of large catshark and skate nursery areas and a new species of gorgonian coral. Cordell Bank NMS, located 42 miles north of San Francisco, was expanded from 529 square miles to 1,286 square miles. Gulf of the Farallones NMS (now called the "Greater Farrallones NMS"), located in the waters adjoining Cordell Bank NMS, and was expanded from 1,282 square miles to 3,295 square miles of ocean and coastal waters.

Released Climate Resilience Toolkit
In November 2014, NOAA released version 1.0 of the web-based U.S. Climate Resilience Toolkit, which helps the Nation address challenges related to coastal flooding and other climate-related risks. The Toolkit responds to the President's State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience's requests for the Federal Government to provide useful, actionable climate information and tools to assist communities in planning for future climate conditions. For instance, the Toolkit includes map generators to illustrate climate-related vulnerabilities that communities face on national and local scales, and summarizes steps communities can take to become more resilient to climate change, such as managing water supply or strengthening infrastructure. The Climate Resilience Toolkit was developed in accordance with the President's Climate Action Plan and is available online at https://toolkit.climate.gov.

Completed Hydrographic and Environmental Surveys in the Arctic

During 2015, NOAA ships collected critical hydrographic, fisheries, and protected species data in the Arctic region, enabling improvements to nautical charts required for safe navigation and providing data on managed species. NOAA Ships *Rainier* and *Fairweather* collected nearly 600 nautical miles of hydrographic data. NOAA Ships *Ronald H. Brown* and *Oscar Dyson* supported a joint NOAA fisheries and research project to study marine ecosystems in the Northern Bering Sea, Chukchi Sea, Beaufort Sea, and Gulf of Alaska. The NOAA Ship *Reuben Lasker* conducted a month-long North Pacific right whale survey off Kodiak Island, Alaska; this data is critical to assessment and management of this endangered species.

Upgraded Hurricane Weather Research and Forecasting Model

On June 9, 2015, NOAA improved operational hurricane track and intensity forecasts for the Western North Pacific, Southern Pacific, and North and South Indian oceans. The Hurricane Weather Research and Forecasting (HWRF) model, which tracks the entire globe to detect tropical cyclones, was upgraded and can now produce forecast guidance out to five days in advance for up to seven separate storms simultaneously. Evaluation of the 2015 HWRF model for the North Atlantic, Eastern North Pacific and Western North Pacific showed a ten percent improvement compared to the model's performance in 2014.

Released Upgraded nowCOAST Tool

NOAA released a major upgrade of nowCOAST in September 2015. The GIS web-based mapping portal provides near real-time coastal intelligence for coastal and marine users on present and future weather, oceanographic, and hydrologic conditions. This upgrade ensures availability of nowCOAST's map viewer and map services 24 hours a day, 7 days a week for emergency management, homeland security, search and rescue, HAZMAT response, and marine operations. The new version features an improved map viewer that enables animations of changing conditions and the use of different base maps. The tool now integrates the latest National Weather Service watches, warnings, and advisories for long-duration hazards; water vapor imagery from NOAA geostationary satellites (GOES); forecast guidance from NOAA operational oceanographic forecast modeling systems; and satellite data on lightning activity.

Initiated an 'Early Warning System' for Freshwater Toxic Algal Blooms

In 2015, NOAA joined forces with NASA, the U.S. Environmental Protection Agency, and U.S. Geological Survey to transform satellite data designed to probe ocean biology into information that will help protect the American public from harmful freshwater algal blooms. The annual cost of U.S. freshwater degraded by harmful algal blooms is estimated to be $64 million in additional drinking water treatment, loss of recreational water usage, and decline in waterfront real estate values. In August 2014, local officials in Toledo, Ohio, banned the use of drinking water supplied to more than 400,000 residents after it had been contaminated by an algal bloom in Lake Erie. This inter-agency effort is designed to be an early warning system for toxic and nuisance algal blooms in freshwater systems by using satellites that can gather color data from

freshwater bodies during scans of the Earth. Based on this information, state and local agencies can provide the public with public health advisories. In addition, the project will improve the understanding of the environmental causes and health effects of these cyanobacteria and phytoplankton blooms in the United States.

FY 2017 BUDGET REQUEST

As noted above, NOAA's FY 2017 discretionary budget request of $5.9 billion further strengthens our efforts to put critical information into the hands of the public. This budget, an increase of $77 million or 1.3 percent over the FY 2016 enacted level, invests across NOAA's diverse portfolio in a number of initiatives that promote the Department's and the Administration's highest priorities, including: 1) enhancing community and economic resilience; 2) investing in mission-critical observational infrastructure; 3) evolving the National Weather Service; and 4) achieving organizational excellence.

1. Supporting Resilient Communities and Economies

Communities around the country are becoming more vulnerable to natural disasters and long-term adverse environmental changes. 2015 was the warmest year on record and saw 10 weather and climate disaster events, including flooding, coastal inundation, and drought, with losses each exceeding $1 billion across the U.S. These events devastated communities while impacting national agricultural, manufacturing, and energy production. At the heart of many of these environmental threats is water—either there is too much, not enough, or it is of poor quality. This is heightening the demand for more integrated water intelligence and prediction capabilities to inform decision-making at all levels about how best to keep communities safe, resilient, and prosperous.

NOAA is uniquely positioned to bring new insights to the water challenges facing our Nation. In FY 2017, we request $12.25 million to establish the Integrated Water Prediction effort to deliver a suite of water intelligence products to help communities and industries make better-informed decisions about how to prepare for and respond to extreme water events. At the heart of this initiative is an enhanced river flooding forecasting system that will increase the number of prediction points from about 4,000 to nearly 2.7 million nation-wide - providing river and stream forecasts at the neighborhood level and bringing flood and stream forecast to 100 million Americans who do not receive one today. This information will better equip communities and emergency managers to prepare for flooding events and to direct resources where they are most needed.

A large part of this work would happen at the National Water Center in Tuscaloosa, AL. This interagency facility researches, develops, and delivers state-of-the-science national hydrologic analyses, forecast information, data, decision-support services, and guidance to support and

inform essential emergency services and water management decisions. The Center currently has 46 staff members in residence from NOAA, USGS, academia, and other partners.
The Integrated Water Prediction initiative will set the stage for future efforts that draw on NOAA's broad expertise to improve our drought forecasts and to better integrate our models on coastal flooding with inland flooding. This effort will provide new information that emergency managers, farmers, water systems, the energy sector, and individuals can use to plan on scales ranging from of days to seasons. It will also allow them to maximize economic opportunity and protect lives and property.

In addition to NOAA's Integrated Water Prediction initiative, we have several other important resiliency initiatives. NOAA is requesting $10 million for the National Ocean and Coastal Security Fund, to help coastal states and other entities better understand and utilize the oceans, coasts, and Great Lakes of the U.S. More specifically, we will partner with the National Fish and Wildlife Foundation to award grants that enhance ecological, economic, social, and recreational benefits of coastal resources. The FY 2017 budget also consolidates the NOAA Fisheries' Coastal Ecosystem Resiliency Grants program into the National Ocean Service's Regional Coastal Resilience Grants program, which will fill a gap for regional-scale, collaborative resilience actions that are funded competitively. The combined program requests a net $5 million increase and will emphasize functional linkages between healthy ecosystems and natural infrastructure for community resilience. Coastal communities have made clear their need for this type of assistance; last year, NOAA received 196 applications totaling over $151 million for both programs. With the $15 million that was available, we were able to leverage over $4 million in matching funds. Clearly, there is a huge demand for this type of funding – and federal investments bring other resources to the table.

In the past few years NOAA has taken a number of significant steps to promote sustainable fisheries and fishing practices worldwide, including the release of the Sustainable Seafood Traceability proposed rule. This rule will improve the ability of the United States to keep illegally harvested seafood out of our markets, reduce seafood fraud, continue to create a more level playing field for U.S. fishermen and will discourage unsustainable and unsafe fishing practices abroad. However, additional funds are needed to ensure that we can enforce these laws, and NOAA is requesting an additional $1.6 million to work with international partners to block the flow of illegal, unreported, and unregulated-caught fish into the global stream of commerce, and ultimately, into the U.S. market.

We are proud that U.S. fisheries are among the world's most sustainable. However, we also know that environmental and economic factors can lead to changes in fisheries that put the economic and environmental resilience of coastal communities at risk. To provide additional support to fisheries that the Secretary has designated a disaster, NOAA requests $9 million in funding for a new Fisheries Disaster Assistance program. By focusing on both environmental

and economic resilience, this new Fund will help the fishing industry and fishing communities address the causes and recover from a disaster, as well as reduce the need for disaster assistance in the future. The recovery phase represents an opportunity for fishing communities to adopt a resilience-centered approach that will support long-term improvements in the ecosystem and economy.

Finally, NOAA is seeking almost $20 million in additional funds to increase consultation and permitting capacity related to the Endangered Species Act (ESA), Marine Mammal Protection Act, and Magnuson-Stevens Act Essential Fish Habitat. This funding will improve permitting and review timeframes for public and private development projects, including those in the Gulf of Mexico supported by the states, the RESTORE Council, and the Natural Resources Damage Assessment Trustees. Demand for consultations is significantly rising: from FY 2012 to FY 2014, we saw a more than two-fold increase in the number of consultations we needed to complete. With such a surge in demand and no increase in resources, NOAA simply cannot keep pace and it has resulted in significant backlogs. At the end of FY 2015, NOAA had a backlog of 1,193 ESA consultations (250 formal, 943 informal), compared to 688 in FY 2014 and 377 in FY 2013. We expect demand to continue to increase, and funding for additional capacity is critical.

2. Investing in Observational Infrastructure that Underpins Environmental Intelligence
NOAA has operational responsibility to provide weather, water, ocean, and climate forecasts. Our global observing systems are the foundation of the information we provide – without them forecast reliability would decay and fail to meet the Nation's growing needs for more precision. We must ensure NOAA's fleet of research vessels and observational platforms can continue to provide the environmental intelligence needed to meet our mission.

Without investment, the NOAA fleet will decline by 50 percent from 16 to 8 active ships between FY 2016 and FY 2028, significantly hindering NOAA's ability to provide the critical observations and services the nation depends on. NOAA greatly appreciates the inclusion of $80 million in the FY16 Omnibus to begin recapitalization. In FY17, NOAA requests an additional $24.0 million to complete design, acquisition and construction of a Regional Survey Vessel (RSV). This RSV will be the first vessel of its class capable of integrated, interdisciplinary, and general-purpose oceanographic research throughout the U.S. Exclusive Economic Zone.

We must also ensure continuity of our satellite operations to continue to provide the data necessary for weather forecasts and environmental measurements into the future. The successful launches of the DSCOVR and Jason-3 satellites, and the upcoming launch of GOES-R and JPSS-1 are major milestones. We are very appreciative of the support Congress gave to NOAA's Polar Follow On (PFO) satellite program in the FY 2016 Omnibus. This year's budget includes $393 million for PFO to continue the JPSS-3 and JPSS-4 development activities and to invest in next

generation technologies that will set the stage for improved NOAA forecasts for decades to come.

3. Evolving the National Weather Service

NOAA's timely, accurate, and well-communicated forecasts inform important decisions in sectors ranging from food security and public health, to aviation, to general retail and of course to emergency management and national security. For this reason, we continue our commitment to build a Weather-Ready Nation and provide the technical underpinning to evolve the NWS to become a more agile organization.

The proposed FY 2017 budget focuses on investing in key ground infrastructure that provides the observations on which our forecasts and warnings are built. For instance, 85 percent of all tornado warnings are currently based on Next Generation Weather Radar (NEXRAD) data. Without investment, NEXRAD availability will degrade beginning in 2020, resulting in long-duration radar outages and regional gaps in service. That is why NOAA is requesting an increase of $8.5 million for the third year of an eight-year Service Life Extension Program (SLEP) to sustain the aging NEXRAD infrastructure. Continued funding for NEXRAD SLEP in FY 2017 will extend the useful life of a $3.1 billion investment by approximately 15 years while next-generation radar technology matures to operational readiness.

Another surface weather observation system that needs investment is the Automated Surface Observing System (ASOS). ASOS systems – a partnership program between the Federal Aviation Administration (FAA) and NOAA are generally located at airports and beam local conditions straight into airplane cockpits for safe navigation. The FAA has already secured funding for updating the ASOS software. In FY17, NOAA is requesting $7.5 million to being updating the hardware through a cost-effective approach that will extend the life of this program, while also providing greater safety, consistency, and accuracy. The ASOS SLEP requires $53 million over eight years to extend the system, which cost $227 million in the mid-1980s, for another 20 to 25 years. Without this investment, ASOS availability will degrade rapidly and cause data outages and regional gaps.

4. Achieving Organizational Excellence

Each and every day, NOAA's employees strive to promote organizational excellence and execute our mission with discipline and consistency. To ensure that our customers receive the best service possible, NOAA must be able to recruit, develop, retain, and reward the best talent. However, in order to do that, we need the infrastructure in place – the Mission Support Services – to support a workforce of the 21st century with Human Resources employees and services that enable NOAA to expeditiously recruit the expertise and talent that Congress, our partners, and our customers demand.

Mission Support Services at NOAA are at a critical breaking point. Based on data pulled in November 2015, there were periods of time in which one NOAA human resources professional serviced 148 NOAA employees – nearly three times the number serviced by HR professionals in peer agencies, such as the National Science Foundation, NASA, or the Nuclear Regulatory Commission based on FedScope data. The funding for these services and other core operations have declined since 2008, and the increased workload that results has led to an attrition rate of HR professionals that is twice that of other agencies.

To begin to reverse this trend, we are requesting funding in FY17 to transform NOAA's current service delivery model to a more efficient one. We have conducted an extensive organizational and process review of the HR function, and have determined it best to move routine HR work, like hiring, to a cross department initiative focused on mission enabling services. While this move will result in cost savings in the long-term, additional resources will be required to get started. The $2.3 million increase requested in FY17 for maintaining capability in the DOC Working Capital Fund is essential for us to create an improved HR tailored service function within NOAA. In addition, the requested $4.4 million for Mission Support Services is necessary to immediately begin to improve oversight, guidance, and administrative operations and services. Without addressing the lack of capacity in HR, NOAA cannot complete the actions it needs to fill the approximately 1,800 empty positions throughout the agency and hire weather forecasters, fisheries biologists, and other important personnel without whom our services are not possible.

We must also give our world-class scientists the tools to turn the investments made in earth science research and development into tangible benefits for American citizens and the economy. Unfortunately, the transition from research to operations often takes far too long. For example, NWS's High Resolution Rapid Refresh model, which has a spatial resolution four times finer than previous models and better pinpoints threats such as tornadoes, flash floods, and heavy snowfall, took 10 years to fully transition from research to operations. To cut this time down and accelerate the delivery of benefits to the public, NOAA has established the policies and administrative mechanisms needed to expedite transitions from the lab to commercial impact.

NOAA's Chief Scientist has spent the last year evaluating the best practices of industry and other agencies to develop the RTAP for identifying and investing in those projects that have a high probability for successful acceleration. The $10 million requested in FY17 will enable faster integration of research into operations to ensure that the American public experiences the benefits of previous federal investments in R&D.

Another key investment in FY17 is the $4.6 million to prepare for the replacement of our Mukilteo Research Laboratory in Seattle, WA. The current structural condition of the facility, which was built in the 1940s has deteriorated to the point that it poses an imminent safety risk to NOAA personnel. In 2015, immediate stabilization of the foundation was needed to render the

building safe for occupancy; but these efforts only extended its certification for occupancy by five years and require continuous monitoring and inspections. NOAA plans to replace the facility because of the unique attributes of the lab – more specifically the access to large volumes of high-quality seawater the location provides. Mukilteo's location plays a key role in the cutting-edge ecosystem recovery, marine pollution, and ocean acidification research undertaken by NOAA scientists, and it is an important NOAA asset that requires immediate investment.

Finally, we are also requesting $6.3 million to improve the resiliency of our data systems and mitigate critical cyber-security vulnerabilities, which is essential based on recent attacks to our systems. NOAA's Office of the Chief Information Officer will lead the effort to coordinate a clear enterprise analysis of the complex interrelationships among all NOAA IT systems. This includes mapping specific system linkages and documenting interdependencies to allow us to mitigate the risk to IT systems that support NOAA's Primary Mission Essential Functions.

CONCLUSION

NOAA's FY17 Budget request reflects the commitment Commerce Secretary Penny Pritzker and I have made to grow a strong economy that is built to last, while being fiscally responsible and focusing on priority initiatives. NOAA is a vital component of the U.S. Government, helping to maximize U.S. competitiveness, enable economic growth, foster science and technological leadership, and promote environmental stewardship. Americans – civilians, the military, and businesses – rely upon the services NOAA provides every single day.

We are fortunate to have a highly skilled and passionate workforce. Our people come to work each day committed to serving the public and advancing our mission. Every one of our investments in the FY 2017 budget – from improving products and services to positioning ourselves for the future – will help the organization as a whole strive for excellence and deliver the environmental intelligence this country needs to better prepare for and respond to the growing environmental challenges we face.

I look forward to working with the Congress and our partners and constituents to achieve the goals I articulated through the implementation of the FY 2017 budget. Thank you for the opportunity to present NOAA's FY 2017 budget request. I am happy to respond to any questions from the Subcommittee.

Dr. Kathryn D. Sullivan

Under Secretary of Commerce for Oceans & Atmosphere and NOAA Administrator

Dr. Kathryn Sullivan was confirmed by the Senate as the Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator on March 6, 2014, having served as Acting NOAA Administrator since February 28, 2013. She is a distinguished scientist, renowned astronaut and intrepid explorer.

Prior to her appointment as Acting Administrator, Dr. Sullivan held the position of Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator, and also performed the duties of NOAA's Chief Scientist, a vacant position.

As Assistant Secretary, Dr. Sullivan played a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She also provided agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. As Deputy Administrator, she oversaw the smooth operation of the agency.

Dr. Sullivan is the United States Co-chair of the Group on Earth Observations (GEO), an intergovernmental body that is building a Global Earth Observation System of Systems (GEOSS) to provide environmental intelligence relevant to societal needs.

Dr. Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, she was appointed NOAA's Chief Scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity.

She was the inaugural Director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, she served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science museums. Dr. Sullivan joined COSI after three years of service as Chief Scientist.

Dr. Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope.

In February 2016, Dr. Sullivan was elected a member of the National Academy of Engineering. Membership honors those who have made outstanding contributions to "engineering research, practice, or education." She was also named a fellow of the American Meteorological Society, the nation's premier scientific and professional organization promoting and disseminating information about the atmospheric, oceanic, and hydrologic services.

Dr. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006). She holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

Chairman BRIDENSTINE. I'd like to thank Administrator Sullivan for her opening statement.

I remind members that the rules limit us to five minutes each for our questioning, and I'd like to recognize myself for five minutes.

Administrator Sullivan, in December before this Committee, the head of your satellite office, Dr. Volz, testified that a more detailed process guide for how commercial companies will partner with your agency would be produced following the final Commercial Space Policy. When I asked for a date, he testified that it would be released in January or February, and of course, now we're past that date. He recently told my staff that the document was off his desk and now "in process." I was just wondering if you might know where that document is now. If it's within NOAA, maybe it's elsewhere in the administration. If you could share any information you have on that?

Ms. SULLIVAN. Thank you for the question, Mr. Chairman.

It is in final review within NOAA is my understanding. That was our original target of the January date, and we share your eagerness to have it out. Our goal with both the the policy and the process is to provide the private sector with both the policy clarity and stability that they seek as well as the more detailed steps they need to follow and the next beyond that will be specific technical details for different measurement sets.

Chairman BRIDENSTINE. And would you maybe at this hearing provide us a date for when we might be able to get that?

Ms. SULLIVAN. I don't have a date certain at my fingertips, Mr. Chairman.

Chairman BRIDENSTINE. Okay.

Ms. SULLIVAN. But I'll be happy to update my inquiry as soon as the hearing is over and get back to your staff.

Chairman BRIDENSTINE. That would be great if you could do that. Thank you.

I'd like some clarification about the process by which NOAA will look to the private sector for radio occultation data. I'm encouraged to see the inclusion of private-sector data options, but I am hopeful that NOAA does not see this only as a secondary option. Can you share with us how you see this process working as far as integrating commercial data into the data assimilation systems?

Ms. SULLIVAN. We see it as a very promising prospect and are moving accordingly to have the opportunity and the ability to test and evaluate it. It is a nascent proposition that the private sector can indeed provide such data so the process and the procedures we're laying out here will give us the opportunity under the pilot programs to do the testing and evaluating that can confirm whether in fact the data quality and reliability meet the standards required to sustain the accuracy and reliability of our forecasts.

Chairman BRIDENSTINE. Okay. I've just got a few minutes here. Hopefully we can do a second round of questions.

Contrary to what we have heard from numerous NOAA officials that have testified before this Committee, I've heard from countless weather and data experts that World Meteorological Organization Resolution 40, WMO 40, does not require the release of all data to the world. In fact, it lists out specific types and in some cases

amounts of data that is open for sharing. I do believe weather is a public good, and I understand the advantages the United States gets from our partnerships with other countries. However, there is a burgeoning weather satellite industry sitting on the sidelines because they are concerned that if they sell data to NOAA, you will turn around and give it away for free, which completely destroys the marketplace before it begins.

I am not advocating for getting rid of WMO 40. I want to be clear about that. All I am asking is for us to actually abide by it. Will you commit to me that we can work together to craft rules for the treatment of weather data acquired from commercial space systems that does not undercut the emergence of a market while still maintaining that our government keeps its commitments to WMO 40?

Ms. SULLIVAN. Mr. Chairman, we have been working closely with your staff over the months that this issue has been evolving. I promise you, we will continue to do that, and let me assure you, we're also working very closely with the WMO itself. I was just over in Geneva last week—the calendar's a bit of a blur—and met directly with the new Secretary General.

Chairman BRIDENSTINE. Thank you for that.

I'll yield my time, or I'll yield my time back to myself, I guess, and recognize the Ranking Member, Ms. Bonamici.

Ms. BONAMICI. Thank you very much, Mr. Chairman, and I just want to follow up on the Chairman's comments.

I hope that we can continue to work together on the Weather Research and Forecasting Innovation Act and find a way to get that through collaboratively, so I appreciate your willingness, Dr. Sullivan, to keep working on that.

We know that the ocean is becoming more acidic as it takes up excess carbon dioxide from the air. On the West Coast, it's been especially difficult for shellfish larvae, and oysters and clams are vulnerable as well. The budget request proposes an increase of $11.7 million for NOAA's Ocean Acidification program. I support this increase. I'm leading a letter asking the Appropriations Committee to fulfill it.

Can you please explain the need for this program and its potential benefits, and also how NOAA is translating its ocean acidification research into practices and strategies that benefit the industry? And I do want to save time for another couple questions.

Ms. SULLIVAN. Yes, ma'am. Thank you very much for the question. We have heard loud and clear from constituents around all the coasts, and I would highlight in particular your state and Washington, about the need to expand monitoring for the water conditions for ocean acidification conditions. There is also still a considerable amount of research that needs to be done to understand the ocean graphic processes and clarify and better understand the mechanisms by which changing ocean acidification may affect shellfish and finfish and other species of key interest.

To your question about translating it to practical benefit, the increased monitoring and research would allow us to continue and deepen our work hand in glove with the shellfish industry, in your state, for example, to make sure that we can give them the monitoring and early warning technologies that let them take actions on the farms to protect their larvae.

Ms. BONAMICI. Terrific. Thank you.

It needs to be repeated that it isn't just the coastal communities that are affected because people across the country buy and eat shellfish that are affected.

There's also been over the last couple of years a significant number of harmful algal bloom outbreaks at the Great Lakes and coastal communities, for example. Now, I was pleased to work with Representative Posey to secure passage of the Harmful Algal Bloom and Hypoxia Research and Control Amendments Act in 2014. Now, NOAA is currently requesting an additional $4 million to continue to develop and operationalize forecasts of harmful algal blooms, hypoxia, and other pathogens. How will this improved forecasting increase economic security?

Ms. SULLIVAN. Thank you also for that question. We have developed through our labs the capabilities now to combine satellite measurements and in situ measurements in calculations that give communities such as the Great Lakes and the Gulf Coast in particular days of warning about when you're going to have a bloom that is of a toxic species and that will reach a concentration that could jeopardize municipal water supplies or fish and shellfish or beachgoers. The time has come. Those techniques are mature enough now to be sure that we can extend them to other coastal regions because we are now seeing increasing frequencies of blooms across all of the United States coasts.

Ms. BONAMICI. Thank you. And finally, in your testimony you mentioned that NOAA's mission support services are at a critical breaking point. There's one human resources professional for every 148 employees, and that is—peer agencies have nearly three times as much HR staff. You mentioned that this has impaired the agency's ability to fill the 1,800 empty positions. Can you explain how NOAA has sought to address these hiring shortages and what you need to ensure that our National Marine Fishery Service, our Weather Service, and other NOAA entities have the employees and the employee support services they need to serve the American people?

Ms. SULLIVAN. Yes. It's a critical point, and the vacancies are concentrated in the National Weather Service and the National Marine Fisheries Service. We have looked to separate the high-touch functions where we really need people talking directly to our scientists and managers from the more mechanical things that facetiously, let me say typing up forms, and wherever possible outsource that mechanical processing to other parties so that our team can work on the front end of things.

We've engaged OPM, we've engaged the Small Business, and in parallel with those actions, because they've not been sufficient to begin to reduce the backlog, we've been working with the Department of Commercial on the development of a more robust shared services model that promises tremendous improvement going forward provided we can make the transition to that model.

The funding that we request for NOAA in this budget is really essential to continuing the contract services we have now in place and beginning that transition to the broader shared services model. It is our one pathway that offers the potential to get past this hur-

dle and back to where we have the full complement of expertise needed to do our mission.

Ms. BONAMICI. Thank you, and I know and appreciate, as I'm sure my colleagues do, the importance of having dollars in the field and in the research. However, that being said, for you to be able to do the work that you need, you must have those support services. So I look forward to working with you on that, and I'm out of time and yield back.

Thank you, Mr. Chairman.

Chairman BRIDENSTINE. I'd like to thank the Ranking Member, and I recognize the chairman of the full Committee, Mr. Smith, for five minutes.

Chairman SMITH. Thank you, Mr. Chairman, and Dr. Sullivan, thank you for being with us today.

My first question goes to RICO, and it is this. Have you or anyone you know been a part of any discussions about using the RICO statutes against anyone who might question some aspects of climate change?

Ms. SULLIVAN. I have been part of no such conversations, Mr. Chairman.

Chairman SMITH. Okay. The Attorney General testified before the Senate last week that she had in fact been part of such discussions and had referred it to the FBI but she did not consult with you nor has anyone at this point?

Ms. SULLIVAN. I have been part of no such conversations.

Chairman SMITH. Okay. That's reassuring to hear because I happen to believe that you shouldn't be prosecuted for disagreeing about climate change.

My next question is this. You're familiar with NOAA's study, sometimes called the Karl study, that found that—or allegedly found that there had been an increase in global warming over the last 18 years. That study was refused by some well-respected scientists in an article that appeared in the publication Nature. I assume you've read the Nature article?

Ms. SULLIVAN. I'm familiar with that paper.

Chairman SMITH. Do you still stand by the Karl study's conclusions or do you now recognize that those conclusions might have been weak and agree with the Nature scientists?

Ms. SULLIVAN. I welcome the debate in the scientific literature that the full publication of the data and information in the Karl paper has enabled. That is precisely what the scientific process———

Chairman SMITH. Right, but both can't be———

Ms. SULLIVAN. —designed to do.

Chairman SMITH. Both can't be correct. Do you feel that the NOAA study is still correct or do you think the Nature article is correct?

Ms. SULLIVAN. If I recall correctly from the Nature paper, the authors of that study themselves say that the Karl study is a valuable scientific contribution.

Chairman SMITH. That wasn't my question. My question goes to the 18-year halt in global warming. The NOAA study said that there had been an increase in warming during that period. The Nature article said there had not been. With which do you agree?

Ms. SULLIVAN. If I recall the original IPCC report from years ago that first used the word "hiatus," that study also said that that did not contradict the fact that the linear trend of temperature continued———

Chairman SMITH. Again, I'm not talking about the linear trend. I'm taking about the 18 years. Do you agree that there was global warming or do you not agree that there was global warming?

Ms. SULLIVAN. Mr. Chairman, I don't study the kinks and bumps in temperature curves at that level of detail and———

Chairman SMITH. The 18 years is important because a lot of studies said that there was no increase in global warming. You were one of the few that said there was. Again, I'll ask you the same question. Do you agree with the NOAA Karl study or do you agree with the Nature scientists?

Ms. SULLIVAN. I stand by the quality and integrity of the scientific analysis that was published for all to challenge, confirm or verify in the Karl study, and I would be interested to follow the scientific debate as it goes forward.

Chairman SMITH. Okay. So you still say that the Karl study was accurate and you disagree with the nature scientists?

Ms. SULLIVAN. I stand by the integrity and quality of the Karl study.

Chairman SMITH. Okay. I wasn't asking you about the integrity and quality. I assume that by that, though, you meant their conclusions as well?

Ms. SULLIVAN. I believe they did a valid job of analyzing new data sets. They proffered analysis———

Chairman SMITH. Then that does answer my question. If you consider their conclusions to be valid, you agree with them; you disagree with the Nature scientists. If you want to be in the minority, that's fine. I just wanted to see what you felt on the record.

My next question is this. To my knowledge, NOAA has not fully complied with our subpoena dated February 22nd. We did get some production two days ago but it was not the full comprehensive production that we requested. Do you intend to comply with our subpoena?

Ms. SULLIVAN. Mr. Chairman, my staff continues to work on the details of these matters with your staff on an almost daily basis, and I assure you, we will continue to move forward on the path that they have agreed to make sure that we satisfy your needs.

Chairman SMITH. And so you do intend to comply in a timely manner?

Ms. SULLIVAN. We fully respect the Committee's oversight responsibilities and have been working diligently since your very first letter to do precisely that.

Chairman SMITH. And so is it fair for me to say that you do intend to comply with the subpoena?

Ms. SULLIVAN. We intend to continue working with your team to fulfill the requests that you've expressed.

Chairman SMITH. Okay. Thank you for that, and yield back, Mr. Chairman.

Chairman BRIDENSTINE. The Chairman yields back.

I recognize the Ranking Member of the full committee, Ms. Johnson, for five minutes.

Ms. JOHNSON. Thank you very much, Mr. Chairman.

Dr. Sullivan, as you know, the various regions of the Nation including my own have been plagued with flooding and drought over the last several years. Therefore, I was pleased to see that the budget request included $12.2 million for a new water prediction initiative. As I understand it, NOAA plans to build up and leverage interagency efforts at the National Water Center in Alabama to create new and improved water predictions, forecasts, and warnings that will help local communities respond to and prepare for floods and droughts. Can you please provide me with a little bit more detail to this initiative? Specifically, how will the capabilities provided by this proposed initiative be different than the current service NOAA provides?

Ms. SULLIVAN. Thank you for that question, Congresswoman, and maybe the simplest way for me to make that clear—I said some statistics in my commentary and my testimony about times 700 of the number of points and a hundred million Americans, but, you know, a picture is often worth 10,000 words, and this is a map that shows the numbers of points that we currently put forecasts out for across the United States, those red triangles. That's the 4,000 points. Many of them are miles away from a downtown. They're on some run of a stream. The new model capability that we propose to launch provided we receive the fiscal year 2017 request turns that 2.7 million points. Well, what does that look like? It looks like that. It turns the map blue. It is almost contiguous coverage like dropping a net, a mesh over the country, and this means that in, you know, communities such as the ones in your area that were hit so bad just recently, the information about what will the water level be won't be a mile or two upstream or some main branch tributary comes in, it'll be in the neighborhood. It'll be right here where it matters to you.

We have heard vividly from emergency managers across the country how powerfully important this would be to them in terms of their ability to better protect their citizens.

Ms. JOHNSON. Thank you.

As you know, the Majority has been investigating the peer-reviewed climate research paper published by NOAA's scientists in the magazine Science last year, and I understand that the paper adds to the scientific body of work examining the concept of a slowdown or hiatus in the rate of global warming over the last 15 years or so.

The Majority has alleged that the publication of the research paper was in some way rushed and that NOAA did not adhere to the Data Quality Act or the agency's scientific integrity process. I know that you have commented some but I'd like to also note that a separate scientific paper that included climate scientist Michael Mann published last month found that this hiatus was real but was temporarily masked by natural factors. Dr. Mann in a story about the paper stated the temporary slowdown in no way implies that human-caused warming has ceased or slowed down.

I point this out to show that it is part of the scientific process. Different scientists examine different parts of similar issues and rarely come to identical conclusions. This does not mean that sci-

entists or others were involved in some grand conspiracy or for political reasons as the Majority believes.

With that in mind, Dr. Sullivan, can you please describe the agency's scientific integrity process, and can you please respond to the allegations which I think you just heard recently just now.

Ms. SULLIVAN. Thank you. NOAA has a very strong and rigorous scientific integrity process that is very widely admired called by many a gold standard. We uphold it very strongly, very firmly, myself, my Chief Scientist, our research council, and it insists upon integrity and independence of science throughout the agency. It includes clear protections to prevent political interference, and in this matter, Congresswoman, let me assure you there has been no political interference.

I had nothing to do with the timing of the report so I can't speak in detail to that. The final timing of the appearance of any publication is of course at the discretion of the publication itself. I do know in this instance the journal Science is one of the most highly respected journals globally, renowned for a very rigorous peer-review process, and recognizing the interest in this matter, in fact, scrubbed this paper with extra diligence, but at the end, when a paper comes out is dependent on the journal.

Ms. JOHNSON. Thank you very much. I yield back, Mr. Chairman.

Chairman BRIDENSTINE. I now recognize the gentleman from Texas, Mr. Neugebauer.

Mr. NEUGEBAUER. Thank you, Mr. Chairman.

Administrator Sullivan, thank you. Could you hold up that last map that you had a while ago? Yeah. And so—and you're trying to turn the map blue. Is that right? Or are you trying to———

Ms. SULLIVAN. The blue color on this side shows the new density of points compared to just the red triangles.

Mr. NEUGEBAUER. Okay. Because I like maps that we try to turn red, so in the future if you want to———

Ms. SULLIVAN. You're asking that I reverse those colors?

Mr. NEUGEBAUER. Would you reverse the colors for me? Thank you.

Thank you for being here. One of the things since I've been on this Committee, and I had brown hair, I think, when I first got on this Committee, but you know, the satellite program has—you know, it's had its problems: cost overruns, you know, delays in getting those satellites flying. And you know, it's consuming a fairly substantial portion of the budget, and you've asked for increases over the years. Can you—and I want to associate myself with Chairman Bridenstine in that I think it's to our benefit, the taxpayers' benefit, especially with the fact that the private sector has, you know, really enhanced since I've been on this Committee their participation in space and now we're using, you know, private companies to launch, I think, to take supplies to the station and so forth. What's your vision about the future? Sometimes, you know, we have—quite honestly, the agencies are resistant to, you know, bringing the private sector into that turf. NASA wasn't—hasn't been overly excited, as you know, in the past about, you know, transitioning some of the programs to the private sector.

But to me, it makes a whole lot of sense because one of things that the private sector has the opportunity to do is get some cost

recovery, you know, from commercial opportunities with the data that they receive from the satellites. So could you kind of give me your Administrator Sullivan position on that?

Ms. SULLIVAN. We are quite intrigued. I mean, we watch the space sector evolve, as anybody does that's dependent on space-related data. In the weather domain, we believe it is a promising but still quite nascent prospect to actually have data flows from private-sector satellites. There have been a number of claims there is some hardware in orbit from at least one company that I'm aware of, but really nothing proven to the level that we require for ingesting something into the National Weather Service, because if we make a mistake on that, we then degrade the forecasts that in fact Americans are depending on every single day.

So our posture and our engagement with the private sector in this regard is just tempered by that concern to make sure we work together to define the best path forward that doesn't jeopardize the quality of American weather forecasting.

I might just add, you know, we work hand in glove with the private sector in the design, development, launching, and flight operations of our satellites today. Those are primarily private-sector companies doing that work on our behalf, and across many NOAA mission areas from weather sensors to tsunami warning sensors, technologies pioneered in NOAA labs, we willingly and eagerly transitioned to the private sector. So if another country wants to install a tsunami warning buoy today, they actually buy it from the SCIC Company for just the reasons you've said.

Mr. NEUGEBAUER. I think one of the things that I would caution you, and it's again, sometimes the requirements that we require of the private sector exceed those that we require of ourselves internally, and that's designed, you know, to make it difficult to create any space for the private sector with "space" not being a pun intended, but—so I would encourage you as you move forward is that, you know, we have to bring those people into the collaboration. I don't think it compromises the mission at what's going on at NOAA, and I think it actually has an opportunity to expand that mission and to free up, you know, very precious dollars that we don't have, you know, of your budget. I think we're going to have to go borrow about 20 percent of that, you know, and charge it to my children and my grandchildren, and they won't even be flying the same satellites, you know, when it comes time for them to be utilizing that data.

So I would just say from my perspective and from a fiscal standpoint is that I would encourage you to make opportunities for the private sector to do that and work on that red map for me too while you're doing it.

I yield back, Mr. Chairman.

Chairman BRIDENSTINE. The gentleman yields back.

I would like to just add, I think his points are right on point. When you think about data from the commercial sector, though, we don't have any way of knowing whether or not that data is as good or better than NOAA's data until we get that process guide so that we have the standards necessary to validate the data. So—and I know we're working on that, and thank you for that.

I now recognize the gentleman from California, Mr. Bera, for five minutes.

Mr. BERA. Thank you, Mr. Chairman. Thank you to the Ranking Member.

Thank you, Dr. Sullivan, for your service to our country and your service at NOAA.

I often hear my colleagues say well, you know, they can't determine whether the climate's changing or not because they're not scientists. Now, I'm a physician by training. I am a scientist, not a climate scientist, but certainly trained in the scientific method and how you collect data, and at the surface if we just think about it, 2015 was the hottest year on record by quite a bit. You know, that's just objective data. And folks may say well, that's not a trend, but 2014 was the second most hottest year, again, objective data. 2010 was the third hottest year on record in recent memory. 2013 was the fourth. So, you know, as a trend, it doesn't take a scientist to realize that the climate's changing and we are experiencing, you know, record heat wave after record heat wave.

Let's drill that down to what it means to the people. You know, in my own district in California and our state, we're going through severe drought-like conditions that are impacting everyone, you know, from our farmers to our consumers. Everyone's chipping in. In my own district, Folsom Lake, which serves, you know, close to half a million people in my community rely on Folsom Lake for drinking water, for surface drinking water. It's been at record lows. And yes, we are having a wetter winter. We are having some snow. But what we realized, you know, over the last 4 or five years is, when we look up at the Sierra Nevadas, our snowpack has been disappearing, and much of that precipitation when we get it is coming down as rain, not as snow. This is a crisis situation.

In my district, we rely on Folsom Lake and Folsom Dam to help manage both flood risk as well as drought risk, and as we go through a joint federal project that will give us much more flexibility to manage both these conditions, weather forecasting becomes increasingly important, and the investments NOAA is making in better forecasting so we can better manage our water in the lake, knowing when we need to increase flows to create more capacity and also when we should hold back on water knowing that, you know, those storms aren't coming. So I appreciate the work you're doing.

I was reading about the Cray supercomputer, and just managing the big data and all the points of data, and I'd be curious about the Cray supercomputer as well as other resources that NOAA has to help us better predict and forecast weather.

Ms. SULLIVAN. Thank you very much for that question, Mr. Bera.

The supercomputing is indispensable to this work. As you can imagine, you have to measure the entire globe and ingest the data and then run the calculations that let us have the kind of foresight that you're speaking about.

One of the exciting projects to me, very specific to your interest, is something called Forecast-Informed Reservoir Operations, which our Weather Service with our research teams and our fisheries teams actually are pioneering out in the Russian River basin for just the reason you said. If we can tell a dam manager with the

Corps of Engineers there's not so more rain coming for at least X amount of time, then they could hold the water that comes in a wave and an atmospheric river instead of letting water go downstream to make room in the reservoir. That has great potential to help add some precision and some greater margin to the water management in your state.

Mr. BERA. Thank you. And anything we can do to help better manage that, provide the funding, make sure when we're writing the manuals that help us manage these reservoirs we're not relying on data from 30 years ago or 40 years ago; we're relying on the instruments that we have today, the tools that we have today, and again, in a state like mine, in a region like mine where we have the dual risk of both flood and droughts, we have to have those tools.

So we very much appreciate the work that NOAA is doing. We want to make sure as we update the manual for Folsom Lake and the management of Folsom Dam we incorporate all that data and the forecasting data, and you know, again, from my perspective, this is a reality that we'll have to deal with. The climate is changing. Managing these resources has incredible impact on individual lives, on our economy, and the more we can recognize that, the quicker we can recognize that the climate's changing and we've got to manage this lifesaving asset and water. The sooner we do that, the better off we'll be. So thank you for your work.

Ms. SULLIVAN. Thank you.

Mr. BERA. I'll yield back.

Chairman BRIDENSTINE. The gentleman yields back.

I now recognize the gentleman from Texas, Mr. Weber.

Mr. WEBER. Thank you, Mr. Chairman.

Dr. Sullivan, are you a fisher person? I guess—is that———

Ms. SULLIVAN. I was a fisher person of sorts when I was a little girl going with my dad, bass and trout fishing.

Mr. WEBER. Freshwater lakes?

Ms. SULLIVAN. Mainly freshwater lakes, very occasionally offshore.

Mr. WEBER. Good. I get some questions on red snappers being from the Texas Gulf Coast. There's been some complaints about the data that's being collected, and your own testimony on page three says that the actual red snapper population has improved 30 percent. Generally across the board most all the stakeholders agree—believe the data to be flawed. What steps have you all taken to improve that data?

Ms. SULLIVAN. Mr. Weber, I don't have specifics about recent data improvement actions pertaining to Gulf snapper fishery right at my fingertips but I'd be happy to get back to you on that.

Mr. WEBER. Okay. That would be good.

And then I was curious about one of the exchanges, I think between you and Ms. Bonamici, that there was salmon fisheries going to be closed off the West Coast because the water temperature had raised. Is that right? Are you aware of that?

Ms. SULLIVAN. I'm not aware of the detailed parameters involved.

Mr. WEBER. Okay. All right. Fair enough.

Changing gears on you a little bit. Last year, NOAA requested money to start the Polar Follow On program, which you received

most of the funding, $370 million. Again this year you're requesting funding for $393 million. In the out years you will be requesting about half a billion dollars annually. JPSS and the GOES–R programs have experienced cost overruns and launch delays in addition to inclusion on the last two editions of the GAO's High Risk Report. Are you aware of that?

Ms. SULLIVAN. I am aware of that.

Mr. WEBER. How can we be assured that NOAA has taken actions to prevent these next Battlestar Galactica satellites you're planning from experiencing those same problems?

Ms. SULLIVAN. Thank you for the question. We did have some schedule and budget difficulties on both programs a number of years ago and have worked hand in glove with the contractors, redone schedules, redefined the budgets, improved our internal program and process management, and substantially strengthened our satellite team. Both the GOES–R and the JPSS programs have now been running on time, on budget, and holding their margins for 30, 36 months each. The programs are sound. They are stable, and we have now management capacity and program plans in place to be sure, for me to be confident that we will execute well on PFO.

Mr. WEBER. Do you anticipate them winding back up on the next High Risk Report?

Ms. SULLIVAN. I can't speak for the General Accounting Office. It is certainly a risk. A gap in satellite data for weather forecasting is certainly a risk to the country that we are all keeping our eyes on. How GAO might classify either that risk or program management risks, we'll have to wait and see. But I have heard from our GAO examiners personally that they now regard the programs as well run and well managed.

Mr. WEBER. Well, I thought the term "Battlestar Galactica" was an interesting term, so may the force be with you as you continue.

Does the Polar Follow On allow for any flexibility to take advantage of rapidly changing technologies and capabilities, or will the satellites we will be flying in the 2030s era, will they be using this old technology?

Ms. SULLIVAN. The Polar Follow On program does two things, Congressman. It locks in some economic advantage to carrying forward existing instrument designs, which are very complex, and in a component of the program called EON–Microwave—EON–MW—it does propose exactly what you're thinking of to put a small down payment on an investment that other parties have done the first investment in, a technology that offers the potential to substantially change the cost parameters on our most important microwave sounding instrument so that we do have new capabilities that are more cost-effective in the future.

Mr. WEBER. Is that the EON—are those the microwave sounders you're talking about?

Ms. SULLIVAN. Yes, they are.

Mr. WEBER. Aren't there some private companies that are developing those?

Ms. SULLIVAN. I know of no private company that's developing the kind of radiometer that makes these precise vertical measurements to the depth of the atmosphere that these specific instruments do.

Mr. WEBER. But you do know of companies that develop the microwave sounders?

Ms. SULLIVAN. Not sounders—microwave receivers that do things like the GPS radio occultation.

Mr. WEBER. Okay. And are you—have you checked with them to see if there's a plan and process for them to begin developing? Are you working with them hand in hand?

Ms. SULLIVAN. We are. We scout that sector actively. We stay engaged with the space community widely. The pilot programs that I've been discussing with the Chairman give both us and the companies the opportunity to really explore and for us to co-invest in helping them actually demonstrate that they have the capabilities they've said to us they aim to provide.

Mr. WEBER. Well, according to the National Space Policy of 2010, NOAA is not supposed—doesn't need to develop that technology. So the more you could do it from a private standpoint I think it's kind of like what Congressman Neugebauer was talking about, the more tax dollars we save. Would you agree with that?

Ms. SULLIVAN. If a technology exists and has been proven, I would certainly agree with that, but that is not currently the case in the microwave sounding arena.

Mr. WEBER. Okay. Mr. Chairman, I yield back.

Chairman BRIDENSTINE. The gentleman yields back.

The idea, of course, behind the commercial interest on this Committee is sharing costs among the different commercial actors that want to buy that data—energy companies, transportation companies, agricultural companies—and ultimately then the government becomes one of many customers and that reduces the cost for the taxpayer.

I'd now like to recognize Mr. Babin for five minutes.

Mr. BABIN. Yes, sir. Thank you, Mr. Chairman.

Dr. Sullivan, NOAA Independent Review Team recommended a gap filler mission as a way to help mitigate potential gaps in the afternoon polar orbit and make NOAA's Polar Satellite program more robust. What is NOAA doing to address this recommendation, and how are those plans reflected in fiscal year 2017 budget request? And are there any other options that NOAA is examining that can enhance the robustness and resiliency of the Polar Satellite Programs?

Ms. SULLIVAN. Thank you for that question, Mr. Babin. We have done a number of things flowing directly from the IRT's report. For one, we structured the Polar Follow On program in a fashion that allows us to shift directions on that if need be and launch a gap-filler satellite in the early 2020s time frame. That was not the direction we were heading prior to the IRT's report so they were very helpful input in that regard.

The EON–Microwave request that is embedded within the Polar Follow On budget line is another one of those examples. As I have indicated, it is an existing technology. We propose to benefit from investments other parties have made in bringing it to its current stage, but to apply some NOAA investment to take it the next steps and really determine and confirm that it could meet the microwave sounding needs that we have. Should that prove true,

and we're fairly confident that it would, then EON–Microwave has the prospect to serve as a gap filler as well.

Mr. BABIN. Okay. Thank you.

And then also, what are the key risks that can affect NOAA's costs and schedule commitments for the polar and geostationary satellites, and what is NOAA doing to address these risks?

Ms. SULLIVAN. Thank you for that question also. Some of the big risks that we had been prone to or vulnerable to in that in fact we've retired a little bit with the first-year funding for the Polar Follow On program because one of the biggest risks when you need multiple satellites to provide the kind of continuity that we need in the weather arena is that you break production, and the companies, the private-sector companies that are working on producing these, release their workforce, lose the tooling, lose the engineering expertise, so as the IRT also pointed out, we had basically been buying a satellite at a time, which is the least cost-effective way to do it. The Polar Follow On program moves us back in a direction of a robust constellation by the 2020s and gets back some of that obsolescence and workforce and engineering risk that happens when you start and stop complex—any complex program. So that is certainly one thing.

We also internally have done a tremendous number of things to strengthen our internal processes and our management structure. We've worked very diligently with our colleagues at NASA, who actually run the contracts and do the procurement for us and with the contractors that they engage, and I think that the team now clearly has demonstrated by several years consecutive strong budget and schedule performance the team now is clearly well in hand and functioning in all cylinders.

Mr. BABIN. Okay, and then what is the lifecycle cost of the GOES–R program, and similarly, what is the lifecycle cost of JPSS's program? How do these costs of these programs compare to the costs of our partners you were mentioning? Specifically, does the Department of Defense and our European partners, do they incur similar high costs?

Ms. SULLIVAN. I don't have all of those lifecycle costs right at my fingertips, Congressman Babin. I do know the JPSS program lifecycle cost remains steady at $11.3 billion, and again, I don't have Defense Department or European figures.

I can tell you that they certainly are of the same order, as witness the European Union's recent launch of their Copernicus and Sentinel series satellites.

Mr. BABIN. Well, I was just wondering if they have dealt with the same number of delays and cost overruns that NOAA has had. Do you know?

Ms. SULLIVAN. We are not out of family with agencies that produce large, complex space systems.

Mr. BABIN. Okay. Then over the last few days, and you even mentioned this in your opening statement, we've seen devastating floods in the southern United States. In fact, I have five of my nine counties that are in an emergency situation right now with an all-time record flooding of the Sabine River and flooding in the Neches and in the Trinity Rivers in Texas.

As spring starts up this year, I'm concerned that severe weather outbreaks and tornados will again put American lives and property at risk, and I wonder, is it smart when we look at the President's budget to be cutting NESDIS, NOS, MOAO, and the National Weather Service? What do you think?

Ms. SULLIVAN. I'm confident that this budget makes sound investments in the targeted places that are most central to public safety and the public welfare and will not be leaving us short on those hazards.

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

Chairman BRIDENSTINE. I'd like to thank the gentleman from Texas.

Regarding the distributed architectures that you talk about to mitigate risks, we fully support that. Polar Follow On is what you were describing. You could also do that through taking advantage of various commercial operators. The National Geospatial Intelligence Agency is doing that with remote sensing and imagery, and of course, communications. The Department of Defense is using distributed architectures with communications by leveraging commercial as well.

I'd like to recognize the gentleman from California, Mr. Takano.

Mr. TAKANO. Thank you, Chairman Bridenstine.

Administrator Sullivan, the changing climate is already having visible impacts around the country. Perhaps nowhere is this change more apparent than among our coastal communities, which remain vulnerable to increasingly severe storms, rising sea levels, and altered marine ecosystems. I am pleased to see that the budget request reflects NOAA's commitment to enhancing the resiliency of our coastal communities.

Can you please describe in more detail how the budget request will improve the resiliency of coastal communities including the $15 million increase NOAA is requesting to expand its Regional Coastal Resilience Grant program?

Ms. SULLIVAN. Thank you very much for that question. I can perhaps best illustrate the vital need that you're referring to by the experience we had with the $10 million we were given for Regional Coastal Resilience Grants in fiscal year 2015. We received 196 proposals from communities across the country for that—for those dollars for a total amount of $151 million. We were able to fund only six programs, six proposals, out of that entire set, but those six proposals are enabling some 100 communities to look at their vulnerabilities, the hazards that they are exposed to, and really begin to lay in concrete plans and take concrete actions from habitat restoration to shoreline protection, to natural infrastructure, to put themselves in a better footing with respect to the changing conditions that you cite, and that's why we're asking for an increase in that funding line this year.

Mr. TAKANO. And these communities are—well, they're on the coast, of course, but the———

Ms. SULLIVAN. They're all across the country.

Mr. TAKANO. Yeah. Well, the budget request—I want to talk about polar orbiting for a moment. The budget request includes an increase of $8.1 million to explore options for the acquisition of radio occultation data from the polar orbit. This includes sustaining

the international partnership with Taiwan to build the second set of sensors and evaluating the possibility of purchasing commercially available data.

Can you begin by describing the value of this data and what the impact would be of losing this capability?

Ms. SULLIVAN. Thank you for that question. This radio occultation data is a very valuable augmentation of the high-precision sounding that we get from the instruments aboard our weather satellites. It helps calibrate and take out bias and inaccuracies that sometimes get into those other data sets. We've kept the door open to possibly going with the government solution, the COSMIC solution, for the simple reason that as I sit here today, that is a technically proven, known system. We know the data quality characteristics of that system. It would be what we've seen in orbit now with the predecessor. So that is a bird in the hand that we know the quality and characteristics of.

As the Chairman has noted, and as we are committed to, we do propose in this budget to proceed with pilot studies, working collaboratively with the private sector, co-investing in the test and evaluation needed to see, to confirm whether the data sources that they propose to offer do in fact live up to those same quality standards.

Mr. TAKANO. But would there be a significant—how can I say this? I mean, the fact that the uncertainty about whether the private data sources are reliable, what would that pose in terms of if they were not reliable? What would that present to us?

Ms. SULLIVAN. If you look at all of the data streams that go into contributing to the quality and reliability of weather forecasts today, the radio occultation measurements rank quite high, in the top six or so of those data sets. They are valuable. We would not want to lose radio occultation.

Mr. TAKANO. So an interruption in reliability would be a significant problem for us?

Ms. SULLIVAN. It would be a concern.

Mr. TAKANO. And then you describe how the evaluation of purchasing commercial radio occultation data through this request—or can you describe how the evaluation of purchasing commercial radio occultation data through this request will work in comparison to the Commercial Weather Data pilot program? Will this effort be distinct?

Ms. SULLIVAN. It will follow the ground rules and guidelines that we—that come from our policy down to the process that is soon to come out and into the detailed technical specifications about particular data types, so about the GPS–RO, so the industry knows they have a stable governance environment for working with us but they also know what the particulars are that they're aiming at in terms of specifications.

Mr. TAKANO. Well, thank you, Administrator. I appreciate your answers.

I yield back.

Chairman BRIDENSTINE. The gentleman yields back.

We're going to go for a second round of questions. If it's okay, I'll recognize myself for five minutes and then the Ranking Member for five minutes.

Real quick. The stage that I think needs to be set is one of national security. In the last Congress, Chairman Wolf mentioned from the Floor of the House that the National Weather Service got hacked into. He attributed it to the Chinese, and it compelled NOAA to shut down some satellites for a period of time. It wasn't too long ago, I think it was in 2007, the Chinese used a direct ascent anti-satellite missile to shoot down one of their own satellites in low Earth orbit.

The reason I think it is important for us to take advantage of commercial is quite frankly to very quickly disaggregate and distribute the architecture as you have rightly identified as one of our goals. One of the challenges to rapidly distribute the architecture is being able to buy data from commercial. It's why we are doing it in the Department of Defense. I'm also on the Subcommittee on Strategic Forces on the Armed Services Committee, and we deal a lot with communication architecture as well as remote sensing and imagery. This is why this is important, taking advantage of commercial. It not only complicates the targeting solution for the enemy but also they have to invest a whole lot more money to jam or hack into numerous different ground architectures as well. So it changes their calculation for how much they have to invest and those kind of things, and it could actually deter them from making those investments to begin with.

This is why it is so important that we correctly interpret WMO 40, and—because if the commercial industry believes that the data purchased by NOAA is going to be given away to the world for free, then they won't create that data to begin with, and if they don't create the data, then it's not a global public good because it's not a good at all, which is a concern of mine.

One of the areas we've been looking at is, how do we comply with WMO 40 and at the same time make sure that we're not destroying a market that would otherwise exist. Some of the areas we've talked about are resolution restrictions. If commercial operators are going to invest in new instruments and technologies and capabilities that are of higher resolution than what the government is building itself, then maybe we can protect that data and not give it away for free to the world and prevent that market from forming.

Also, we've talked about data tiers. Maybe the first 20,000 radio occultations can come from COSMIC and beyond that there'd be another tier of data where we can augment our systems with even more radio occultations, and of course, we've had testimony on this Committee indicating that more occultation—there is no limit to the benefit of more occultations. We need more and more and more, and it gets the models better and better and better and in some cases we can actually lose some of the primary sensors when you have that much radio occultation data. And then of course, time delays. Certainly the data doesn't have to be shared to the world immediately but maybe if we delay it for 24 or 48 hours, we can create the market and be in compliance with WMO 40.

So I wanted to talk—you mentioned that you had talked to folks in Geneva regarding WMO 40. Can you share with us what their thoughts were on it and kind of the direction they're thinking about going?

Ms. SULLIVAN. Thank you for the question, Mr. Chairman. I've not been in discussion at this level of detail about particular tactics or methods with the Secretary General. He doesn't operate at that level either.

But to the point of confirming that the world is changing, there are interesting and different prospects emerging. You know, the arrow of time only goes in one direction. We all know that. And it's important that we find ways forward that engage with and understand and explore these new prospects, and also that we do that in a way, to use an engineering term I know—you'll understand from your pilot background—let's make sure that we do a make before break connection, like an astronaut with a tether or a mountaineer. These data are valuable to forecasts today as I know you appreciate very well. Let's make sure we've got our hand firmly on a real replacement that we know brings the same or better value before we let go of this one.

In the policy framework, we've set out the process we hope to bring to you shortly and the specifications that we'll set up. The conversations we've had with industry on the subject have all been with that motivation.

Chairman BRIDENSTINE. Thank you for that. And just so you know, on the Armed Services side we're working with the Department of Defense. They're looking at commercial data buys as well to help accelerate this process again for national security reasons, which is a good thing.

I want to switch gears real quick. I want to talk about spectrum. As I understand it, the administration has asked federal agencies to identify areas of spectrum that could be utilized for other purposes. There's a slide up. I just want everybody to look at it. It is also my understanding that weather data streaming from settlements to ground stations could be severely impacted if required to move or share spectrum with other users. Obviously when we open up spectrum and we share spectrum, we can jam ourselves, and I think NOAA and this Committee are going to be in agreement that the last thing we want to do is release spectrum to be used by other operators that would hinder our ability to predict severe weather.

[Slide.]

When you look at this slide here, you can see the areas that have been blacked out because of interference from other people using the same spectrum.

Does NOAA advocate for moving or sharing spectrum when it comes to our weather satellites?

Ms. SULLIVAN. Thank you, Mr. Chairman, and let me say at the outset how much we appreciate your keen understanding of this interest and its potential impact on our mission.

We support the President's policy to recognize the growing arena of broadband in the world that we live in these days, but we do support ensuring that there is a clear and established process, realistic timelines, and that we, NOAA, are provided the means and the time that might be needed to provide what adjustments or protections to prevent this sort of interference happening.

I know you have heard we're seeing interference even at one of the test sites where there is a pilot test of an exclusionary zone.

We're still seeing that kind of interference from sources that are up to 100 miles away.

Chairman BRIDENSTINE. Over the horizon communications for the Department of Defense these days overwhelmingly is commercial. About 80 percent of it is commercial. That's within—a lot of it is within the Ka frequency spectrum, and in fact, the 5G networks are looking at maybe not cannibalizing but sharing more of that 5G, or more of that Ka spectrum, and it's very dangerous for the war fighters because ultimately they're the ones that need the information and they need it complete and they need it when they need it, and we don't need to be worrying about interference.

With that, I will yield back the negative two minutes that I've taken and recognize Ms. Bonamici for as much time as she may consume.

Ms. BONAMICI. Thank you, Mr. Chairman, and I just want to follow up on your last two minutes that you yielded back because I think that this challenge of spectrum is something that we can work together on on a bipartisan basis with NOAA to make sure that that challenge is met because we certainly don't want interference, and there does need to be a process.

I do, even though Mr. Weber's no longer here, want to respond to his comment for the record. I did mention in my opening statement that there are some regional fisheries' managers in the Northwest considering closure of Oregon and Washington ocean salmon fisheries in certain areas in large part because of the weak forecast for coastal coho salmon, to which is attributed warm water in the ocean. So I want to thank you, Administrator, for including in the Office of Oceanic and Atmospheric Research section climate competitive research on the impacts of climate on fish stocks. I think that research will be very helpful to the industry.

I did want to follow up as well, Dr. Sullivan, on the comment that I made in my opening statement about the concern about the reduction of the education and awareness grants through the Tsunami Hazard Mitigation program. We found that different coastal communities are not only different in their topography but also have different communication needs, different awareness needs depending on how far it is to get out of the Tsunami Inundation Zone or, you know, how flat the ground is. There's lots of factors, and the grants are really designed to help communicate threats, especially to vulnerable communities.

So can you talk a little bit about why that reduction is included in the budget?

Ms. SULLIVAN. Thank you, Congresswoman. That budget does—that request or that proposed change does request some of the hard choices we have to make to try to live within our means. We have many such programs that we know provide valuable information the communities use to address their resiliency and their protection from the specific hazards that they're facing. In this particular case, our judgment is that the TsunamiReady programs that runs in each community through our Weather Forecast Office provides an avenue to meet that need.

Ms. BONAMICI. Thank you. I hope so. It is really a serious issue with the coastal area, and it's hard—this will be hard to explain to my constituents but I will look forward to working with you on

that other program and hope that that is sufficient to meet the needs.

The Committee's also been interested in increasing the transition of research conducted in the Oceanic and Atmospheric Research Office to the National Weather Service. This is something that the Chairman and I spoke about when working on the weather forecasting bill. It appears that some real progress has been made between those line offices, and I'm pleased that the budget request includes $10 million to accelerate the transition of research to operations across NOAA. So can you please describe how NOAA plans to accomplish this goal, and will this address the need to accelerate the transition of research from the academic community and the private sector into NOAA operations, and if so, how?

Ms. SULLIVAN. Thank you for that question. We've seen some great advances in our operational products in recent years. The High Resolution Rapid Refresh Model, which gives four times the resolution the ground, is one example. But that took almost ten years to get into operations, and there are a couple of factors in play that this budget proposes to address. One is shifting our high-performance computing models from stepwise acquisition to lease structures, which is one of our proposals, lets that capability evolve more seamlessly and more smoothly. But this program, the RTAP program, addresses the other problem.

What we learned as we canvassed NASA and DOD, DARPA and private-sector entities is, good work that sits here on the research bench or in the journal ready to go and pertinent to certain needs doesn't get transferred across on its own. Magic does not happen. It takes a dedicated funding line and an intentionally built program structure such as the Defense Department has to reach into the research arena knowing what a need and unmet need is and help co-invest in the transition of that work, to refine it and tune it precisely to the operational needs so it can pay that dividend to the war fighter or to the citizens.

We've worked carefully. My Chief Scientists has a background at the Office of Naval Research as well as earlier experience in NOAA. We have laid out the administrative structure. We have laid out the competitive guidelines. We've adopted the technology readiness levels, all of the structure needed to make sure that our researchers see how to move things along and our operators see where to reach, and with this budget we propose to start exercising those mechanisms at the $10 million level. The first round of the Congress give us this appropriation, we would focus internally to make sure we get the training wheels really running, but it is absolutely then our intent that this is the technique we can use to harvest from NSF or DOD or anywhere else where there's promising work that we could put to the benefit of the American people.

Ms. BONAMICI. Thank you very much.

My time is expired. I yield back. Thank you, Mr. Chairman.

Chairman BRIDENSTINE. I'd like to thank the Ranking Member, and of course, everything you just mentioned from my constituency perspective, moving from a day where we have warn-on detection to warn-on forecasts are critically important to my state of Oklahoma so we can get higher lead times for tornados and other things, so thank you for that.

I'd like to thank the witness for her valuable testimony and the members for their questions. The record will remain open for two weeks for additional comments and written questions from the members. The hearing is adjourned. Thank you.

[Whereupon, at 3:26 p.m., the Subcommittee was adjourned.]

Appendix I

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by The Hon. Kathryn Sullivan

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record The Honorable Lamar Smith (R-TX)

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Questions for Administrator Sullivan

1. **Questions regarding the timing and process surrounding Incidental Harassment Authorizations (IHAs) for Seismic exploration in the Atlantic:**

a. **In some cases it has been over two years since initial seismic permits were submitted to NMFS for proposed acquisition of data in the Atlantic, when will NMFS issue or deny the proposed IHAs?**

We are currently working on the applications, but no date for public comment has been scheduled. To clarify, NMFS received the requests for Marine Mammal Protection Act (MMPA) incidental take authorization between August 18, 2014, and March 3, 2015. Due to deficiencies in the applications received, extensive work with the applicants was required before the applications were determined to be complete (*i.e.*, the "initial acceptance" date referred to below) between June 24, 2015, and July 21, 2015.

b. **NMFS is required, under the Marine Mammal Protection Act, to make decisions on IHAs within 45 days following the initial acceptance of applications and comment period. When are final IHAs expected to be issued?**

The NMFS decision regarding issuance of an authorization or denial of a request cannot be presupposed prior to completing the required analyses and public comment. We are currently completing preliminary analyses and will then offer our proposed action for public review, as required by the MMPA. No date for public comment has been scheduled.

c. **IHAs are effective for one year so the process for making a decision should not last up to two years. Why have decisions on IHAs taken longer to complete than their effective date?**

The process has taken an unusually long time for a variety of reasons.
The Atlantic is a new frontier for oil and gas development and there are novel issues to resolve in this first round of IHAs. These are complex actions of a large temporal and spatial scale, and there are substantive issues that need to be worked through before a decision may be made. NMFS worked diligently and positively with multiple companies to assist them in their efforts to produce adequate applications that contain the

information required by regulation at the level of detail necessary to conduct the required analysis to make the necessary findings for an incidental take authorization.

The multiple separate requests for authorization NMFS initially received took differing and inconsistent approaches to describing their proposed surveys and to providing information related to potential environmental effects. NMFS helped the companies to develop their applications so that they described the proposed surveys in a reasonably consistent fashion. As a result of our reviews, several companies substantially altered their initial approaches to the analysis to better use available information and to propose techniques that better align with best practices related to acoustic exposure estimates. It has been challenging to work through novel policy issues related to the assessment of potential effects to marine mammals and to develop an appropriate suite of mitigation measures that satisfy the statutory and regulatory requirements.

Furthermore, due to the large volume of distinct comments, including references to dozens of journal articles and other scientific literature, a substantial amount of time was required simply to review the information received during the initial public review period on our Federal Register Notice announcing receipt of applications.

NMFS is committed to careful review and to ensuring appropriate use of the best available information in satisfying the requirements of the MMPA and NMFS' implementing regulations for these surveys. We expect improved processing time for any subsequent IHA requests for this area.

2. Questions regarding the process of analyzing new information and making decisions based on information not available to the public

a. How does NMFS decide what constitutes "new information" when in the process of reviewing applications for IHAs? Is there any other "new information" the agencies are reviewing and/or anticipate to apply during the review process for current seismic applications?

New[1] cetacean density models produced by Duke University researchers in collaboration with NOAA scientists and other researchers were first made available to us in the spring

[1] NMFS recognizes that there is always new information, and that ongoing regulatory processes cannot continually incorporate such information. However, these density models represent a substantive update of the available information, and NMFS' analysis indicates that there are meaningful differences in the outputs of the 2015 Duke University models and the previously available density models -- the U.S. Navy's 2007 NODEs models. These meaningful differences were deemed significant enough to require incorporation of this information immediately. The 2015 Duke University models involve substantial improvements over the 2007 Navy models: (1) incorporate 60% more shipboard and 500% more aerial survey effort; (2) control for the influence of sea state, group size, availability bias, and perception bias on the probability of making a sighting (NODEs controlled for none of these); (3) considered 14 dynamic environmental covariates (NODEs considered 2); and (4) implemented other methodological improvements (omitted here for brevity). The Duke analysis provided models for all East Coast taxa, with 15 of these modeled with density surface models (i.e., higher quality model), whereas the NODEs models left 11 taxa unmodeled and provided only 11 density surface models. In summary, the "new" cetacean density models bridge an 8-year gap in available information, incorporate substantially more information, and involve meaningful methodological improvements.

of 2015 (after applications were initially submitted but prior to those applications being deemed complete). We then made the information available to all applicant companies. One of the companies elected to use the models at that time. Although the models had not yet been formally peer-reviewed, they had been heavily vetted by marine mammal scientists at NOAA and elsewhere during development, and we were confident that the models were unlikely to change substantively during the peer-review process.

Subsequently, during the initial public review period of the applications, Duke University provided us with a letter detailing the methodology involved in producing new cetacean density models and contrasting that methodology with that used to prepare older models. This information provided new context for the models and led to our determination that these were the best available scientific information concerning marine mammal occurrence in the Atlantic. NMFS then completed an analytical comparison between the new models and the old models that other applicants used, indicating that while differences would likely vary across species they may be significant in some cases. We then reiterated to the applicant companies that the new models constituted the best available information and informed them of our preliminary findings. The companies declined to use this information on their own; therefore, we are working to incorporate the model outputs into our analyses in a way that appropriately corrects the exposure estimates submitted using the older models.

We do not anticipate and are not aware of any additional new information that must be considered.

b. While NMFS has relied on the new density models for processing the pending applications, we understand the agency is also refusing to utilize peer-reviewed threshold criteria developed by NMFS. Please explain why the new threshold criteria is not being used by NMFS?

The new threshold criteria referred to here are not yet finalized. In fact, new changes proposed for the draft guidance were recently made available for public review and comment (through March 30, 2016). The updated acoustic guidance (currently in draft), which has been classified as a highly-influential scientific assessment, is only to be applied once it has undergone the full suite of review and is finalized. The analyses and compliance processes in which the acoustic guidance is expected to be used can take multiple years to conduct and require significant resources from both the regulators and regulated groups (*i.e.,* not a quick or simple adjustment). NOAA is working closely with federal agencies and engaging with the regulated community to identify the most effective and efficient way to transition to the use of this new acoustic guidance.

c. It goes against Congressional intent and sets bad precedent to hold the regulated community accountable for information which is not publically available – such as the recently released density models. Please justify the legal grounds for making decisions based on information that is not publically available?

Duke University scientists, in collaboration with researchers from NOAA and other institutions, developed federally-funded density models for cetaceans in the Atlantic Ocean. The models use a publicly available open source geoprocessing tool for marine research and conservation called Marine Geospatial Ecology Tool (MGET). The inputs to the model are publicly available. The study's investigators shared the unpublished models and results with NMFS. NMFS then shared this information with the Bureau of Ocean Energy Management (BOEM) and made it available to IHA applicants. Notably, BOEM scientists agreed that this information constituted the best available information and required its use in a separate, sophisticated modeling effort conducted to assess impacts of seismic survey activity in the Gulf of Mexico (this report will be included as a component of a Draft Environmental Impact Statement planned for release to the public within the next month). A peer-reviewed manuscript describing the models and model results was subsequently published with no substantive changes having been made as a result of the peer-review process; the models and model results (as well as underlying data) are all publicly available and have been confirmed to be the best available scientific information.

3. **In the time that NMFS has been considering several IHA applications from seismic vendors, it has also received and approved IHA applications from various academic institutions to use the same seismic technology. Are both parties held to the same standards in terms of take modeling rigor and marine mammal data sets used in their analysis?**

Yes. The most recent authorization for marine mammal take incidental to an academic seismic survey comparable to those currently proposed by industry applicants was issued on August 21, 2014, prior to the availability of the cetacean density models referred to here. Consideration of any future academic seismic surveys proposed in U.S. waters of the Atlantic Ocean would be based on the best information available at the time.
The temporal and spatial scale of the typical academic seismic survey is small compared with the activities currently proposed by industry in the Atlantic. One academic survey required 30 days of effort in a relatively small area off New Jersey, whereas industry-proposed surveys are planned for a full year, use multiple seismic source vessels operating independently of each other, and would occur throughout state and federal waters and beyond, out to 350 nautical miles (nmi), from Delaware to Florida. The academic survey involved approximately seventeen times less effort than the largest of the proposed industry surveys. Additionally, NMFS has been working closely with the National Science Foundation (NSF) for years to establish documentation and coordination processes that ensure consistency with regard to content and approach to effects analysis for NSF research activities, which also saves on processing time.

4. **NMFS seems to be under the impression that new information relevant to application review must be applied retroactively or at any point of the process it deems fit. However, new information can be fed into the regulatory process and can be accounted for through the approval of specific projects via Environmental Assessments. How will NMFS approach this process for inclusion of the new density models?**

   We do not agree with the characterization in the first sentence of the question. NMFS is required to consider the best available scientific information for each incidental take authorization application it receives, taking into account the timing of the information relative to the application and the timing of the specified activity.

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record The Honorable Jim Bridenstine (R-OK)

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Questions for Administrator Sullivan

1. **What plans does NOAA have to integrate the numerical weather models with other long term weather and climate modelling, such as the CFS?**
   a. **Are there plans to incorporate or merge short term weather models into a larger climate model?**
   b. **What effects would this have on the accuracy and timeliness of short term weather models?**
   c. **What is the reasoning behind this? Doesn't long term modelling have little skill after two weeks?**

As part of its future direction in streamlining the suite of operational numerical prediction models, NOAA's National Weather Service is moving forward with a Unified Global Coupled System (UGCS) for weather and climate prediction. The UGCS will be fully coupled for both data assimilation and model forecasts for medium-range (~10 days), sub-seasonal (~monthly) out to seasonal (~1 year). UGCS will include atmosphere, land-hydrology, ocean, sea-ice, waves and aerosol/chemistry components, and be run in an ensemble (probabilistic) mode with corresponding reanalysis and reforecasts (for calibration and skill estimates). Skill in deterministic forecasts out to 10 days will be replaced with skill in the ensemble forecasts beyond 10 days and out to 1 year. Such an earth system model will be able to predict phenomena over a range of temporal and spatial scales from 10 to 50 kilometers (km), including hurricanes, winter storms, drought, ENSO, and other extreme events. The coupling of more earth-system components should improve forecasting on all time scales.

The UGCS will have no impact on the accuracy and timeliness of short term weather models. Numerical weather/climate prediction is constantly improving. Without development work continuing in these fields, there will be no progress. It wasn't too long ago when pundits were proclaiming that numerical weather prediction would have no value beyond a day or two. We now have reliable daily weather forecasts extending to 10 days and longer, and for weather trends longer than that. While the skill beyond two weeks does not rival daily weather prediction skill within the first two weeks, skill will increase as our models, environmental information, and integration continues to improve.

2. **What amount of FY 16 funding and the FY 17 request is dedicated specifically to preventing a satellite data gap?**

NOAA is implementing a multi-pronged gap mitigation approach to mitigate the impact of and reduce the potential for any gaps in order to achieve uninterrupted access to space-based data to support its weather, space weather, and environmental monitoring mission in the polar-orbit, the geostationary orbit, and from Deep Space.

The first component of the multi-pronged approach is to ensure that our satellite acquisition activities remain on schedule, within budget, and are launched on time.

- Actions taken with FY 2016 Enacted Appropriations:

  - All of the JPSS Program's FY 2016 enacted funds of $809.0 million are being used to support Suomi NPP operations, complete and prepare JPSS-1 satellite for launch, continue acquisition of the JPSS-2 satellite, and support necessary upgrades to the JPSS ground system. The JPSS-1 development is on track for a launch commitment date no later than the second quarter of FY 2017. The JPSS Program continues to maintain the JPSS-2 launch commitment date of no later than the first quarter of FY 2022. Suomi NPP has been the primary afternoon satellite since May 2014 supporting National Weather Service numerical weather prediction (NWP) data needs. The NOAA Polar-orbiting Operational Environmental Satellite, NOAA-19, has been serving in a back-up mode. Both satellites are providing data that are used by NWS and the US weather enterprise.

  - With the $370.0 million appropriated for Polar Follow on (PFO), NOAA is funding the following activities:

    - Initiate development of PFO/JPSS-3 to meet a launch readiness date in the second quarter of FY 2024, and PFO/JPSS-4 development to meet a launch readiness date in the third quarter of FY 2026. Instrument contracts for the four main instruments have been completed and instrument development has started.

    - Work to achieve robustness in the afternoon polar weather constellation as early as FY 2023 by supporting the option to accelerate PFO/JPSS-3 as a contingency mission with critical sounders Advanced Technology Microwave Sounder (ATMS) and Cross-track Infrared Sounder (CrIS) only.

    The FY 2016 funding for PFO was essential to minimize the risk of a loss of continuity of polar observations and to meet the PFO launch readiness dates that are designed to minimize the potential for a gap in polar-orbiting satellite coverage.

  - With the $871.8 million appropriated for the GOES-R Series Program, the first satellite in the series, GOES-R, is completing its development and being readied for launch in early FY 2017. Work is continuing on the other satellites, GOES-S, -T, and –U. Legacy GOES-NOP Series satellites are providing operational support as GOES-East, GOES-West, and GOES-14 as the on-orbit spare. These satellites are providing data and services that are being relied upon by the NWS and the US weather

enterprise. GOES satellites provide an important "nowcasting" capability for NWS forecasters.

- The DSCOVR satellite, the first operational satellite in Deep Space, approximately 1 million miles from Earth, has been undergoing post-launch calibration and validation. The National Weather Service (NWS) Space Weather Prediction Center (SWPC) will start using DSCOVR as its primary operational asset to replace the use of NASA Advance Composition Explorer (ACE) satellite beginning July 27.

- The FY 2017 President's Budget request of $2.5 million will support NOAA's planning to ensure timely development and launch of the next operational space weather satellite. Space Weather Follow on will provide data continuity before DSCOVR reaches the end of its useful life.

- NOAA-19 and secondary satellites, NOAA-18 and NOAA-15 are providing data collection services – satellite-assisted search and rescue (SARSAT) and Argos Data Collection Service (Argos). The multi-agency Cooperative Data and Rescue Services (CDARS) program is using the $0.5 million appropriated in FY 2016 to finalize a Memorandum of Agreement between NOAA and the Department of Defense to use the Air Force Hosted Payloads Solutions program to launch these instruments.

- With $8.1 million appropriated for the COSMIC-2 ground system, NOAA will continue development of the ground segment in order to utilize Global Navigation Satellite Systems radio occultation (GNSS RO) data from the COSMIC-2A satellites which are scheduled for launch in early FY 2017. The launch of the COSMIC-2 satellites helps to mitigate the impacts of a potential loss of critical sounder instruments from NOAA's polar observing system.

- With an appropriation of $3.0 million, NOAA has initiated the Commercial Weather Data Pilot (CWDP) to assess the capability of the commercial sector to provide radio occultation data for the polar orbit to ensure the collection of a global distribution of RO data supporting numerical weather models and forecasts.

The second part of the multi-pronged gap mitigation approach is to continue follow-on activities designed to minimize the possibility of satellite data gaps and build robustness in the polar-orbiting, geostationary, and Deep Space orbits. The President's FY 2017 Budget request builds on FY 2016 investments to continue development of the JPSS, PFO GOES-R, Space Weather Follow on, CDARS, and COSMIC missions.

- Actions supported by the FY 2017 President's Budget request:

  - For the JPSS Program, full funding of the President's FY 2017 Budget request of $787.2 million, will allow NOAA to complete JPSS-1 development, launch the satellite no later than Q2 FY 2017, and support on-orbit calibration and validation. The funding will support continued operation of the Suomi NPP satellite while the

JPSS-1 satellite undergoes post-launch checkout. The funds will also support continued development of the JPSS-2 satellite in order to meet planned milestones.

- The PFO program has requested $393.0 million to continue development of PFO/JPSS-3 and JPSS-4 satellites to build robustness in the polar satellite constellation and minimize the probability of realizing a gap in data availability. Within these amounts, $10.0 million has been requested to initiate the Earth Observing Nanosatellite-Microwave (EON-MW) project as a gap mitigation strategy. EON-MW would provide some of the capabilities of the ATMS instrument, including atmospheric temperature and moisture readings

- With the $752.8 million requested for the GOES-R Series Program, NOAA will continue and complete calibration and validation of the GOES-R satellite following launch in early FY 2017 and place the satellite into operations. The funds will also be used to continue development of the GOES-S, -T, and –U satellites.

- With the requested $3.7 million, NOAA will support DSCOVR as an operational mission.

- The $2.5 million requested for the Space Weather Follow on, a replacement system for the DSCOVR satellite to launch in the FY 2020 time frame.

- With the requested $0.5 million for CDARS, NOAA will continue preparations for a hosted payload procurement for placing the SARSAT and Argos instruments on orbit.

- With the $16.2 million requested for the COSMIC-2 program, $8.1 million will be used to complete the development of the ground segment in time for the COSMIC-2A launch. The remaining $8.1 million will be used to either develop sensors that will be flown on the COSMIC-2B satellites or to pursue a purchase of similarly calibrated and validated commercial data, meeting NWS stands for incorporating data in NWP models.

- With the requested $5.0 million, NOAA will complete the Commercial Weather Data Pilot (CWDP) work started in FY 2016 to determine if RO observations from all responding commercial providers can meet NOAA mission and observation requirements for radio occultation.

The third part of the approach is to complete the activities funded by the Sandy Supplemental appropriation, which were selected from the April 2015 gap mitigation plan. The 17 projects selected for implementation were deemed the most important to mitigate the impact from the potential loss of polar orbiting data. NOAA is working to execute these projects to ensure NOAA's weather forecasting capabilities should a gap occur. This includes assessing the feasibility of using non-NOAA data sources to helping to meet data requirements.

NOAA uses a number of fora to assess the availability of non-NOAA data to meet its observational requirements such as the U.S. Group on Earth Observations, which coordinates

Federal Earth observation activities in cooperation with domestic stakeholders, fosters improved Earth system data management and interoperability, and works to formulate US positions in the intergovernmental Group on Earth Observations. The Coordination Group for Meteorological Satellites is the global coordination of the operational meteorological satellite systems, including protection of in orbit assets, contingency planning, improvement of quality of data, support to users, facilitation of shared data access and development of the use of satellite products in key application areas.

a. What amount of each is being used for commercial data alternatives?

NOAA will use the $3.0 million appropriated in the FY 2016 Omnibus Appropriations bill for CWDP activities. NOAA will use the results of the FY 2016 CWDP to inform how funds will be spent on commercial sources of data. In FY 2017, the President's Budget requests (PBR) $5 million to continue activities started in CWDP in FY 2016. The FY 2017 PBR also provides an opportunity for NOAA to either acquire GNSS RO instruments for COSMIC-2B mission or to pursue a GNSS RO commercial data buy.

3. How do the costs of NOAA's GOES and JPSS programs compare to the costs of our partners? Specifically, does the Department of Defense and our European partners incur similar high costs? Please be exact in providing figures.

NOAA does not have access to detailed procurement costs for geostationary or polar-orbiting satellites developed by our Department of Defense and EUMETSAT partners.

a. Have they dealt with the number of delays and cost overruns that NOAA has?

Delays and cost overruns are a common experience in the satellite industry as a result of the complexity and limited production numbers. These delays and cost overruns are experienced by satellite developers, government and private sector, and these experiences are apparent, especially when new systems and capabilities are developed. Delivery of the satellite systems into space depends on the launch industry, which is characterized by limited numbers of capable/reliable suppliers and is highly susceptible to external factors. NOAA seeks to minimize the impacts due to cost overruns and delays by prudent planning.

b. Do you discuss respective costs with your partnering Agencies?

Discussions with respect to costs with our domestic or international partnering agencies are limited and do not delve into great detail because of the need to preserve business confidential information.

4. How will you be testing and evaluating commercial data? What process is there to determine whether the data would be worth incorporating into the numerical weather prediction?

For any commercial data set, NOAA will first conduct preliminary quality testing on raw instrument data to ensure they meet specified characteristics (such as having sufficient signal-to-noise ratio, etc.). Second, these data will be processed into atmospheric data records which will

be validated and calibrated for use in NOAA's numerical weather prediction (NWP) modeling systems. These atmospheric data records will be compared to existing alternative observations and to corresponding values predicted from the current NWP output.

Finally, the impact of new data on NWP will be evaluated by conducting an observation system experiment (OSE), which is accomplished by making two runs of the global NWP model - one with and one without assimilating the new data - and comparing performance of the two runs.

To determine whether any set of commercial data can be incorporated into the operational NWP system, NOAA will consider whether the data are found to improve the model forecast at a statistically significant level through the OSE process at a comparable or lower cost than other data sources. In addition, NOAA must consider whether the data will meet criteria for reliability and latency to support the NWP. These criteria of quality, reliability, and latency are standard for evaluating all data for use in NWP modeling, and are independent of the source (commercial, government, international, etc.) and observation type. These criteria are included in the draft NESDIS Commercial Space Activities Assessment Process[2].

a. If you find data that should be incorporated into the numerical weather prediction, will you decide to pay for it by decommissioning less relevant data sources you are already using?

NOAA has a requirements prioritization system that considers all potential data sources to satisfy requirements. If data are demonstrated to increase the skill of NWS numerical weather prediction capability or other mission requirements, that information will be incorporated in the agency's decision making process for future investments. This process includes full information on the value, cost effectiveness, and exploitability of the data, as well as comparisons with the same factors for existing and other new data sources.

b. What examples of relatively low value data are you currently using?

NOAA does not have any low value data we are currently using. NOAA uses a structured process to manage the product life cycle process from product development, transition into operations, enhancements, and eventual retirement. Decisions to retire a data source, or a product or service are guided by these processes.

5. Your budget request indicates $8.1M is intended for purchasing either COSMIC 2 instruments or commercial data. What is your criteria for deciding which to pursue?

The criteria for deciding which option to pursue will fall in the categories of those provided in the draft NESDIS Commercial Space Activities Assessment Process, which includes the accuracy, quality, timeliness, reliability, validity, cost effectiveness, and exploitability of the data. Information used to inform these criteria will be the initial output from the Commercial Weather Data Pilot, and information known about the COSMIC-1 and COSMIC-2 systems.

[2] https://www.regulations.gov/document?D=NOAA-NESDIS-2015-0132-0002

a. Are specific detailed plans publicly available?

Plans for the COSMIC-2 program are publicly available. NOAA released a Commercial Space Policy in January 2016, and more recently NESDIS released the Commercial Space Activities Assessment Process for public comment in April. As required by appropriations, NESDIS also submitted a report to Congress outlining the activities related to the Commercial Weather Data Pilot in March 2016. Key among these activities is the release of an RO Request for Proposals in summer 2016.

6. What weather research models at NOAA have demonstrated a high level of skill that have not transitioned into operations?

Currently, the National Centers for Environmental Prediction (NCEP) Environmental Modeling Center (EMC) runs an operationalized version of the National Center for Atmospheric Research (NCAR) Weather Research and Forecasting (WRF) Advanced Research WRF, or WRF-ARW. The WRF-ARW was initially developed in the early-2000's by NCAR for research on convective storms, and the model was shown by OAR/NSSL scientists to provide unique and skillful guidance for severe convection to operational forecasters at higher resolution than previously possible. In the late 2000's,OAR group then began an R20 project to operationalize a configuration of the WRF-ARW known as the High Resolution Rapid Refresh (HRRR) model for NCEP/EMC. For the past 2 years, the HRRR has been operational at NCEP/EMC and provides a new 15 hour forecast every hour for the NWS. OAR's Global Systems Division (GSD) at the Earth Systems Research Laboratory continues to improve the HRRR and works with NCEP to update the operational model with an annual update cycle. Recent updates include increasing the temporal and spatial resolution. OAR's National Severe Storm Laboratory is developing a Warn-on-Forecast configuration of the WRF-ARW model and this configuration has shown promise in analyzing and predicting individual thunderstorms at very high resolution and with a high level of skill. However, this next-generation modeling system will not be ready for full operational implementation for 5-10 years. GSD has three models that have shown a high level of skill that have not been transferred into operations. The HRRR Ensemble or HRRRE is a 3km model that uses ensemble data assimilation and has 6-9 members that produce probabilistic forecast information every hour over the current HRRR CONUS domain. The larger-domain HRRRE enables the Warn-on-Forecast modeling efforts by providing the boundary conditions for the smaller-domain, high resolution WOF model to run. GSD also has the HRRR-Alaska that extends the HRRR model technology to include Alaska. Finally, GSD has been running in research mode the Finite Element Icosahedral Model (FIM), a hydrostatic model that has shown skill in both extending the forecast beyond 10 days and in predicting tropical cyclones.

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record
The Honorable Bruce Westerman (R-AR)

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Questions for Administrator Sullivan

1. Likened by the Interior Dept. to a "national zoning plan,"[1] "coastal and marine spatial planning" (otherwise known as "marine planning") is a central feature of the National Ocean Policy, pursuant to the July 2010 Executive Order 13547. Under the initiative, new "regional planning bodies" are tasked with creating marine plans for review and approval by the new National Ocean Council.

Even in regions of the U.S. where all states decide not to participate on a regional planning body to carry out the policy's marine planning initiative, federal agencies nonetheless are directed to "identify and address priority science, information, and ocean management issues associated with marine planning as described in the Executive Order."

Language adopted by the National Ocean Policy Executive Order states that the policy's marine planning effort will require "significant initial investment of both human and financial resources," and the National Ocean Council previously noted that federal agencies were asked to provide information about how "existing resources [can] be repurposed for greater efficiency and effectiveness" in furtherance of the National Ocean Policy.

In addition, pursuant to the National Ocean Policy Executive Order, NOAA serves on the National Ocean Council, and NOAA representatives have been participating in the policy's marine planning initiative in regions including the Northeast, Mid-Atlantic, Gulf of Mexico, and Pacific Islands. However, NOAA FY 2017 budget documents do not include any specific references to the National Ocean Policy, including NOAA's active participation on the National Ocean Council and Northeast and Mid-Atlantic Regional Planning Bodies. Rather, the budget documents merely include general statements noting that (1) current National Centers for Coastal Ocean Science focus areas include marine planning; (2) U.S. national shoreline data layer updates support marine planning; and (3) the requested NOAA Competitive Research grant program increase would improve and deliver spatial planning tools to communities.

a. As a member of the National Ocean Council, please describe in detail any NOAA *resources and/or personnel* that have been or will be directed toward activities in support of the National Ocean Policy. In doing so, please provide references to specific FY 2017 budget request line items that would support NOAA's continued participation in National Ocean Policy activities, including but not limited to participation in NOP coastal and marine spatial planning activities.

Response: Marine planning is not zoning. Marine planning is a non-regulatory tool that provides transparent information about ocean use, involves the public and stakeholders in decisions affecting marine resources, and results in inclusive, science-based, bottom-up planning. The National Ocean Policy coordinates and aligns federal agencies' coastal and ocean-related actions under existing missions and mandates to increase efficiency, decrease duplication, and maximize services provided to the American people.

The budget does not request any funds or staff that are explicitly devoted to carrying out the President's National Ocean Policy. NOAA, like other National Ocean Council Agencies, has a number of existing programs and resources committed to ocean related management activities, missions, and objectives under existing authorizations or other legislation. The National Ocean Policy does not alter, replace, or extend these existing funding commitments or directives. Rather it helps to better focus and leverage these existing, limited resources and allows for more efficient use of taxpayer dollars by improving coordination and collaboration, and identifying clear priorities and associated actions. For example, NOAA work to support coastal communities' resilience efforts or to facilitate safe navigation also supports the National Ocean Policy.

b. Please describe in detail NOAA's *planned and completed activities* with regard to National Ocean Policy implementation.

Response: The National Ocean Policy Implementation Plan was released in April 2013 and provides guidance for more than 25 Federal departments, bureaus and agencies. The most recent Report on the Implementation of the National Ocean Policy was released in March 2015. It is available at: *https://www.whitehouse.gov/sites/default/files/docs/nop_highlights__annual_report_final_-_150310.pdf*

2. The Explanatory Statement that accompanied the funding bill providing appropriations for the remainder of FY 2016 (P.L. 114-113) notes that for NOAA, "No funding was provided in fiscal year 2015, and none was requested by any agencies funded in this Act in fiscal year 2016, to implement the National Ocean Policy. Consequently, no funds for National Ocean Policy activities are included for any agency funded in this Act."

At the same time, NOAA's FY 2017 budget justification notes that current National Centers for Coastal Ocean Science focus areas include marine planning, U.S. national shoreline data layer updates support marine planning, and the requested NOAA Competitive Research grant program increase would in part improve and deliver spatial planning tools to communities. In addition, NOAA continues to be an active participant in major National Ocean Policy initiatives including coastal and marine spatial planning, under which it serves as the federal co-lead for the Northeast Regional Planning Body and a core federal member of the Mid-Atlantic Regional Planning Body.

a. What is the source of funding for NOAA's continued participation in implementation of the National Ocean Policy's coastal and marine planning initiative?

Response: Any NOAA activities that support the National Ocean Policy are carried out through existing programs and authorities. For example, NOAA routinely provides grants, technical assistance and consultation services to coastal and Great Lakes states and others under various laws and authorizations, including the National Sea Grant College and Program Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Coral Reef Conservation Act, the Coastal Zone Management Act, the Ocean and Coastal Mapping Integration Act, and the Integrated Coastal and Ocean Observation System Act, to name a few. Therefore, in regions where state and other partners are voluntarily participating in regional planning bodies, NOAA may be providing support to state and other partners.

b. How is NOAA's continued participation in these activities consistent with the Explanatory Statement to P.L. 114-113?

Response: See answer to 2a. In P.L. 114-113 Congress included appropriations for a broad range of NOAA ocean and coastal program activities. Because Congress appropriated funds for these programs and activities, it would be inconsistent for NOAA to interpret the guidance in the Joint Explanatory Statement as a blanket prohibition on mission-related, critical activities Congress funded within its Operations, Research and Facilities appropriation.

The National Ocean Policy aims to have agencies execute their existing missions and mandates more efficiently by identifying shared priorities, sharing data, working through potential conflicts, coordinating decision-making, and eliminating duplication of effort. For example, by prioritizing shared data and agency collaboration to achieve efficiencies, the policy helps to maximize appropriated funds to the benefit of ocean users, coastal communities, and taxpayers.

3. While the National Ocean Council has stated that the National Ocean Policy "does not establish any new regulations or restrict any ocean uses or activities," the recommendations adopted by the National Ocean Policy Executive Order state that effective implementation will require "clear and easily understood requirements and regulations, where appropriate, that include enforcement as a critical component."

As to marine plans developed under the policy, federal agencies are "expected to formally incorporate relevant components ...into their ongoing operations or activities consistent with existing law," and the Executive Order requires federal entities to implement the National Ocean Policy to the maximum extent. National Ocean Policy actions thus serve as precursors to regulatory activity.

a. Please describe in detail how NOAA intends to support implementation of National Ocean Policy activities. In doing so, please specify which such activities

or types of activities might necessitate requirements or regulations for implementation.

Response: NOAA supports implementation of the National Ocean Policy in a manner consistent with its existing Congressionally-approved authorities and appropriations. A primary goal, indeed an obligation, of all public agencies is to carry out their programs effectively and efficiently. Therefore, NOAA will continue to employ coordination and collaborative approaches (some of which dovetail with the National Ocean Policy), to implement its existing programs more effectively and efficiently. Examples of activities are included in the March 2015 Report on Implementation of the National Ocean Policy, which can be found at: *https://www.whitehouse.gov/sites/default/files/docs/nop_highlights__annual_report_final_-_150310.pdf*

b. What if any commitment can you make that NOAA will not participate in any actions that could have a regulatory impact pursuant to the National Ocean Policy, including but not limited to the issuance of regulations to bring fishery management plans into compliance with new coastal and marine spatial plans?

Response: NOAA will carry out its responsibilities in full compliance with applicable statutes and law.

4. The National Ocean Policy foundational documents and subsequent National Ocean Council guidance and Regional Planning Body charters make clear that Regional Planning Body federal member approval of final coastal and marine spatial plans will commit the respective entity to aligning all future actions in accordance with the plan(s), including through regulations where necessary.

a. Please fully describe and explain your views and understanding of the power of a NOAA signature on a marine plan in terms of impacts on future NOAA decision-making and regulatory activities.

Response: NOAA, in conducting decision making and rulemaking, routinely consults with stakeholders and the public both through formal and informal processes. A Federal agency official's signature on a voluntary marine plan indicates the intent of the agency to support the plan to the extent practicable under existing law and consistent with its missions and authorities.

b. Do you agree that NOAA representatives serving on Regional Planning Bodies charged with developing marine plans under the National Ocean Policy have the power to commit the agency to indefinite compliance with a marine plan by virtue of affixing their signature to the plan?

Response: See response to Question 4a and 4c.

c. **In reviewing draft marine plans and determining whether to sign the document, what is the extent to which federal Regional Planning Body representatives representing NOAA will be required to seek review and approval from senior NOAA/Commerce Dept. officials and the Office of Management and Budget, and which if any specific officials would be involved in any such review/approval process?**

Response: All 25+ NOC agencies, including OMB and NOAA, will have the opportunity to review draft regional plans before any Federal agency in the region signs on, committing the agency to support the plan to the extent practicable under existing law and consistent with its missions and authorities.

5. On February 12, 2016, the National Ocean Council announced the public release of new Guidance on Marine Plans and a 2016 Annual Work Plan.

The marine planning guidance document includes critical new details, including guidance related to public review of draft marine plans (e.g. minimum of 30 days and maximum of 90 days, without specifying the particular type of public review required and excluding an absolute Federal Register publication requirement), as well as the National Ocean Council's marine plan review/certification process.

However, rather than providing stakeholders and the public with an important and transparent opportunity to provide insight and input on the proposed guidance through public review and comment, the National Ocean Council merely released the document in final form.

As to the 2016 Annual Work Plan, without providing further information, that document notes that there are 150 remaining National Ocean Policy implementation actions which cannot be completed due to changing circumstances or that are continuing to progress as originally envisioned or with modifications. It further notes that a "longer-term, higher-level" implementation guide is under development and will be posted online when completed. The 2016 Annual Work Plan states that the longer-term guide "will provide the overarching context and vision for crafting the Annual Work Plans and implementing the NOP in future years."

a. **As a member of the National Ocean Council, please fully describe and explain NOAA's involvement with the development and approval of the new marine planning guidance document.**

Answer: NOAA, along with all National Ocean Council members, was provided an opportunity to review and comment on the Guidance for Marine Plans.

b. **As a member of the National Ocean Council, did NOAA at any time recommend the release of the guidance in draft form for public review and comment. If so, please fully describe and explain the response to the NOAA recommendation, and if not, why not?**

Answer: No. The National Ocean Council issued the guidance to respond to inquiries from regions interested in developing plans. The Guidance includes sections on the need for public participation and public review of any regional plans that may result.

c. **As a member of the National Ocean Council, please fully describe and explain NOAA's involvement with the development and approval of the 2016 Annual Work Plan.**

Answer: NOAA, along with all Council members, was provided an opportunity to review and comment on the 2016 Annual Work Plan.

d. **As a member of the National Ocean Council, did NOAA at any time recommend the release of the 2016 Annual Work Plan in draft form for public review and comment. If so, please fully describe and explain the response to the NOAA recommendation, and if not, why not?**

Answer: The Annual Work Plan informs internal member agencies on the status of ongoing interagency efforts and areas where multiple agencies may benefit from coordination. As an internal, working document, public review or comment was not warranted.

e. **As a member of the National Ocean Council, please fully describe and explain NOAA's involvement with the development and approval of the longer-term guidance document that has not yet been completed.**

Answer: NOAA, along with all Council members, will be provided an opportunity to review and comment on any longer-term guidance document.

f. **As a member of the National Ocean Council, has or does NOAA intend to recommend the release of the longer-term guidance in draft form for public review and comment. If such recommendation has already been made, please fully describe and explain the response to the NOAA recommendation. If not, does NOAA intend to make a public review/comment recommendation, and if not, why not?**

Answer: NOAA, along with all Council members, will be provided an opportunity to review and comment. Whether or not NOAA recommends public review and comment would depend on the scope and content of the guidance.

g. **As a member of the National Ocean Council, please fully describe and explain each of the150 remaining National Ocean Policy implementation actions that NOAA is involved in but has not yet completed. In doing so, for each such action please describe whether the action is proceeding as originally intended or has been modified, and list any actions that NOAA was directed to complete but cannot complete due to changing circumstances.**

Answer: The most recent Report on the Implementation of the National Ocean Policy was released in March 2015. It is available at https://www.whitehouse.gov/sites/default/files/docs/nop_highlights__annual_report_final_-_150310.pdf

6. In conjunction with the development of the Northeast Regional Planning Body's marine plan (NOAA is federal co-lead), RPB members last summer discussed the need to convene a workshop or series of workshops with agency staff to discuss draft marine plan products and the development of agency guidance on their use.

Despite public requests for any such workshops to be public and that a written meeting record subsequently be made available, at a subsequent October 2015 Northeast Regional Planning Body Stakeholder Forum, it was noted that at least one interagency workshop took place (without any accompanying public notice or record).

In addition, despite public requests for more time for public review and comment on the Northeast and Mid-Atlantic draft marine plans, Regional Planning Bodies in both regions continue to move forward with planning for mere 45-day public comment periods.

a. Please fully describe and explain NOAA's involvement associated with any non-public governmental workshops held in 2015 related to the development and implementation of the Northeast marine plan.

In doing so, please include any and all notes, correspondence, and other documentation associated with such workshops. In addition, please explain whether NOAA requested that any such workshops be open to the public and/or recorded for subsequent public dissemination, and if so, what the response was to any such NOAA recommendation, and if not, why not.

Answer: NOAA is not aware of any formal government workshops relating to development of the Northeast marine plan that were not open to the public. The entire process has been highly transparent and has included numerous opportunities for public engagement, attendance and comment. This includes the creation of the website referenced in this question, which includes the following statement:

The Northeast RPB has committed to a transparent, open approach to regional ocean planning that engages the public and focuses on stakeholder involvement at key decision points. The vehicles and activities for involving stakeholders will evolve as the RPB works to meet this commitment and the needs of interested parties.

To develop the first iteration of the regional ocean plan, the Northeast Regional Planning Body is committed to the following schedule, which includes many opportunities for public participation.

b. Do you believe that a 45-day public comment period for the draft Northeast and Mid-Atlantic marine plans is sufficient, particularly given that these will be the

Nation's first such plans and the associated regulatory uncertainty and potential impacts they will have on a variety of commercial and recreational interests that contribute trillions of dollars to the U.S. economy?

Answer: Yes. However, it is NOAA's understanding that the period for public review of plans for the Northeast and Mid-Atlantic was 60 days.

7. Legislation signed into law in December that provides federal government funding for the remainder of FY 2016 includes a provision authorizing the establishment of the "National Oceans and Coastal Security Fund." Language accompanying that provision prohibits the use of any National Oceans and Coastal Security Fund dollars to "fund the creation of national marine monuments and marine protected areas, marine spatial planning, or the National Ocean Policy."

The FY 2017 budget proposal includes a NOAA request for a $10 million appropriation for the fund. In so doing, NOAA also notes that potential funding priorities may include "[e]fforts to better understand the various services that coastal, ocean, and Great Lakes ecosystems provide including ways to maximize resilience and sustainability of those services through different management approaches such as...Marine Protected Areas."

a. **Please explain how the proposed use of requested funds to potentially include support for management approaches including marine protected areas would not be inconsistent with the prohibition on the use of any National Oceans and Coastal Security Fund dollars to support the creation of marine protected areas.**

Answer: NOAA will spend any appropriated funds for the National Oceans and Coastal Security Fund in compliance with Title IX of P.L. 114-113, the National Oceans and Coastal Security Act. The submission states that a priority is to understand ecosystem services and how different approaches taken by NOAA and its partners, such as restoration, shoreline protection, MPAs, and harmful algal bloom control, affect resilience and sustainability. NOAA does not intend to use these funds to create marine monuments or marine protected areas or carry out marine spatial planning.

b. **Please fully describe and explain your interpretation of the prohibition on the use of any funds appropriated to the National Oceans and Coastal Security Fund to support the creation of national marine monuments, marine protected areas, marine spatial planning, and/or the National Ocean Policy.**

Answer: NOAA will spend any appropriated funds for the National Oceans and Coastal Security Fund in compliance with Title IX of P.L. 114-113, the National Oceans and Coastal Security Act.

c. **In the event that any funds are appropriated to the National Oceans and Coastal Security Fund, do you unequivocally pledge not to use any such funds to support the creation of national marine monuments and marine protected areas, marine spatial planning, or the National Ocean Policy?**

Answer: NOAA will spend any appropriated funds for the National Oceans and Coastal Security Fund in compliance with Title IX of P.L. 114-113, the National Oceans and Coastal Security Act.

8. The National Ocean Policy Implementation Plan directs NOAA (as a National Ocean Council member) to implement what has been described as a "fundamental shift" in the way that the federal government manages ocean, coastal, and Great Lakes resources by adopting an "ecosystem-based management" (EBM) approach.

Specifically, EBM must be incorporated into environmental planning and review processes by 2016. In addition, the National Ocean Council (which includes NOAA) is directed to "[c]omplete formal interagency partnership agreements ...regarding coordination and leveraging efforts to achieve EBM."

a. **Please describe in detail any completed or planned activities of NOAA in furtherance of the new ecosystem-based management requirement under the National Ocean Policy. In doing so, please explain any "fundamental shifts" in federal resource management that have occurred since the National Ocean Policy was established.**

Answer: Ecosystem-based management (EBM) is an approach that integrates across multiple sectors and that considers the entire ecosystem, including humans. The goal of EBM is to collectively manage natural resources, habitat, and species in a sustainable manner, while maintaining ecosystem productivity and resiliency so that it can provide the services humans need and want on a long-time basis. EBM differs from traditional approaches focusing on single species, sectors, and activities, in that it considers different aspects of ecosystem management through an integrated and comprehensive approach. EBM, which is informed by science, is intended to support decision-making. Implementing EBM is not a requirement and any activities undertaken by NOAA and its federal partners pertaining to EBM were conducted based on existing statutory authorities not the National Ocean Policy.

The EBM approach is not new and has been implemented to varying degrees for several decades. So NOAA, in collaboration with federal partners, conducted a study exploring the current extent of EBM implementation by federal agencies. The study found substantial differences in perceived and effective use of EBM across programs. Currently EBM best management practices and principles are not implemented evenly among programs examined. This analysis identified gaps in the implementation of EBM strategies and highlighted ways to better inform natural resource managers and planners.

b. **Please explain how incorporation of EBM into NOAA environmental planning and review processes could impact human access to and activities in the coastal and marine environment. In doing so, please explain how such an incorporation of EBM would be different from current standards using best available scientific**

information, and what metrics would be used to determine whether EBM has been achieved.

Answer: The goal of EBM is to collectively manage natural resources, habitat, and species in a sustainable manner, while maintaining ecosystem productivity and resiliency so that it can provide the services humans need and want on a long-term basis. Therefore the EBM approach will enhance ecosystem productivity and resilience, thus ensuring ecosystem sustainability for current and future generations.

A key element of EBM is to identify and incorporate the best available scientific information that may be necessary to support decision-making processes. Scientists and resource managers work collaboratively to ensure the scientific information is available to support the specific management question.

The study, noted above, that explored the current extent of EBM implementation by federal agencies did inventory metrics that are employed by programs implementing EBM. Examples of metrics include: Improve society's ability to plan and respond to climate variability and climate change using NOAA climate products and information; number of ecosystem assessments and forecasts completed.

c. **Please explain in detail what if any public process NOAA plans to use to determine goals under EBM.**

Answer: Ecosystem-based management (EBM) is an approach that integrates across multiple sectors and that considers the entire ecosystem, including humans. The goals that are set for EBM implementation and outcomes are established in a collaborative process among decisions makers and stakeholders at the initial stages of implementation. Thus a public engagement process is very much a core principle of EBM. Examples of principles for effective EBM implementation include, but are not limited to, the following:

- Ecosystem Resilience- supports ecosystem resilience to maintain ecological functions and services;
- Recognize Humans- recognizes that humans and their activities are an integral part of the ecological system as a whole, and that sustainable use and values are central to establishing management objectives;
- Place Based- place-based, with geographic areas defined by ecological criteria, and may require efforts at a range of spatial and temporal scales (short-, medium- and long-term);
- Incorporate Science - seeks to incorporate and reflect scientific knowledge regarding natural resources, impacts, etc., as well as expert, traditional, and local knowledge;
- Inclusive and Participatory - inclusive and encourages participation at all stages by various levels of government, indigenous peoples, all stakeholders;
- Flexible and Adaptive - flexible, adaptive, and relies on feedback from monitoring and research because ecosystems and human activities are

dynamic, the ocean is undergoing rapid changes, and our understanding of these systems is constantly evolving.

d. Given resource, data, technology, and knowledge gaps, please explain how NOAA plans to implement EBM by 2016.

Answer: EBM relies on the availability and exchange of accurate ecological, social, and economic information regarding the connections among multiple components of ocean and coastal ecosystems. To advance scientific research in support of EBM and adaptive management approaches, NOAA and federal agencies are aiming to better coordinate and leverage interagency capabilities to meet the science needs. NOAA, in collaboration with federal agencies, is working to enhance the use of existing science-based tools and frameworks, and support research to create new ones that support EBM.

9. Section 6(b) of Executive Order 1354726 that established the National Ocean Policy in July 2010 requires "[e]ach executive department, agency, and office that is required to take actions under this order shall prepare and make publicly available an annual report including a concise description of actions taken by the agency in the previous calendar year to implement the order, a description of written comments by persons or organizations regarding the agency's compliance with this order, and the agency's response to such comments."

a. Pursuant to this requirement, has NOAA --a member of the National Ocean Council-prepared and made publicly available any such annual report for calendar years 2010, 2011, 2012, 2013, 2014, or 2015? If so, please describe the findings and contents of such reports, and if not, why has this not occurred?

Answer: Subsequent to the issuance of the Executive Order, the National Ocean Council opted out of this requirement because so many of the actions involved coordination among several agencies. The emphasis has been on the public engagement and agency development of the Implementation Plan. The most recent Report on the Implementation of the National Ocean Policy was released in March 2015. It is available at https://www.whitehouse.gov/sites/default/files/docs/nop_highlights__annual_report_final_-_150310.pdf

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record
The Honorable Suzanne Bonamici (D-OR)

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Questions for Administrator Sullivan

1. **Dr. Sullivan, A wet winter has led to many landslides in my home state of Oregon. In fact, as much as a third of Oregon is considered at a high risk for landslides, and those that have already occurred have caused devastating loss of life and property. How is the National Weather Service leveraging its unique, real-time weather forecasting capabilities to coordinate with other agencies, such as the U.S. Geological Survey, to better protect citizens from natural hazards such a floods, landslides, mudflows, and debris flows?**

   Answer: The National Weather Service (NWS) routinely coordinates with our federal partners, including the U.S. Geological Survey (USGS), with a particular focus on heavy rainfall forecasts and potential landslides and debris flows in areas impacted by wildfires, and locations that have already experienced landslides. Working with USGS, NWS issues debris flow forecasts and highlights areas particularly vulnerable to these types of events. NWS uses its network of dissemination capabilities and works with local media and other members of the weather enterprise to communicate the potential of these events to the public. NWS also briefs local emergency managers about the possibility of these events, should the forecast conditions arise.

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Subcommittee on Environment

Hearing Questions for the Record
The Honorable Dan Lipinski (D-IL)

An Overview of the Budget Proposal for the National Oceanic and Atmospheric Administration for Fiscal Year 2017

Questions for Administrator Sullivan

1. In 2010, the National Weather Service (NWS) added three aviation forecasters to the Chicago Area Forecast Office as part of the "Golden Triangle Initiative" pilot project. These meteorologists focused specifically on aviation-related forecasting, such as alerting airports and the FAA of weather related changes that could cause flight delays. According to data released by NOAA, the project resulted in an immediate reduction of weather related delays in the Chicago area by over 50 percent.

Last January, NWS management decided to forego filing two forecaster vacancies in Chicago. As a result, the NWS terminated the Golden Triangle Initiative services provided by the Chicago office because it could no longer accommodate the workload without additional staff. I'm concerned about this issue as a frequent flyer because it could lead to more weather related delays. I understand that these are tight budget times and that NOAA, like other agencies, is forced to make some difficult decisions, but it seems like a shame to lose a promising program like this. Could you please explain what led NWS to make this decision and the potential impacts it may have?

Answer: The National Weather Service (NWS) is proud of the comprehensive aviation weather services we provide to our aviation partners across the country, and we are committed to continuing and evolving these services to best meet their needs. The NWS provides a core level of aviation forecasting services from all 122 Weather Forecast Offices (WFO), 21 Center Weather Service Units (CWSU) and the Aviation Weather Center, which includes meteorological support at the Federal Aviation Administration's (FAA) national Air Traffic Control System Command Center (ATCSCC, or Command Center).

The NWS created seven positions in 2009 and 2010 for a demonstration project designed to test enhanced aviation weather services for key terminals in Atlanta, New York, and Chicago. The NWS did not request and was not provided any additional resources for these positions. The FAA did not request this level of support and has not communicated a requirement for the additional support provided at these locations. This demonstration was called the Golden Triangle Initiative (GTI).

During the past six years, NWS has realized significant improvements in short-term, small-scale computer models (e.g., the High Resolution Rapid Refresh – HRRR) as well as larger scale models. The HRRR was developed specifically to enhance short term convection predictions that impact aviation. These developments and a renewed focus on aviation support improved our forecasts and support for the FAA.

The FAA requested additional meteorological support at the FAA Command Center, located in Warrenton, Virginia. The FAA reimburses the NWS for four meteorologists and desires to increase the number of NWS meteorologists at the Command Center to six.

Recent staffing changes are due to the natural evolution of a demonstration project, with the affected meteorologists in these positions moving into other positions within the agency on their own accord. Due to the departure of two of the three staff who supported the GTI demonstration in Chicago, in December 2015, the NWS Central Region Director proposed to NWS Headquarters that the demonstration-related aviation weather services at the Chicago NWS WFO would change, effective January 24, 2016. NWS is focusing its hiring efforts on filling vacant positions at our field offices – WFOs, RFCs, CWSUs, and national centers.

This demonstration succeeded in furthering the new whole office concept to meeting decision support requirements, and makes it feasible to continue to meet FAA requirements using existing WFO staff. The changes are as follows:

- The Chicago WFO, in collaboration with its CWSU, will provide the same services that are provided to all FAA partners nationwide at the Core 30 Airports in major metropolitan areas, as well as some key enhanced services that were developed for the Golden Triangle Initiative. For example, in lieu of the WFO, the Chicago CWSU will provide the following enhanced services during normal duty hours (0500 to 2100 LST)
    - Proactive phone briefings to O'Hare and Midway towers
    - Proactive phone calls to the Chicago TRACON when changes in specific weather thresholds are expected,
    - Monitor and participate in national FAA planning teleconferences and Chicago Sidebars,
    - Provide weather training for Air Traffic Managers.

- WFO staff will continue to be available to answer questions from Chicago TRACON, 24 hours per day and will provide the following services
    - Be available for contact by ATC staff,
    - Update Terminal Aerodrome Forecasts (TAFs) every three hours, consistent with the Core 30 Airports that are in major metropolitan areas with the highest volume of traffic, with updates as necessary, down from the current two-hour TAFs that were being done during demonstration,
    - Update the Aviation Forecast Discussion four times daily, instead of ten times daily.

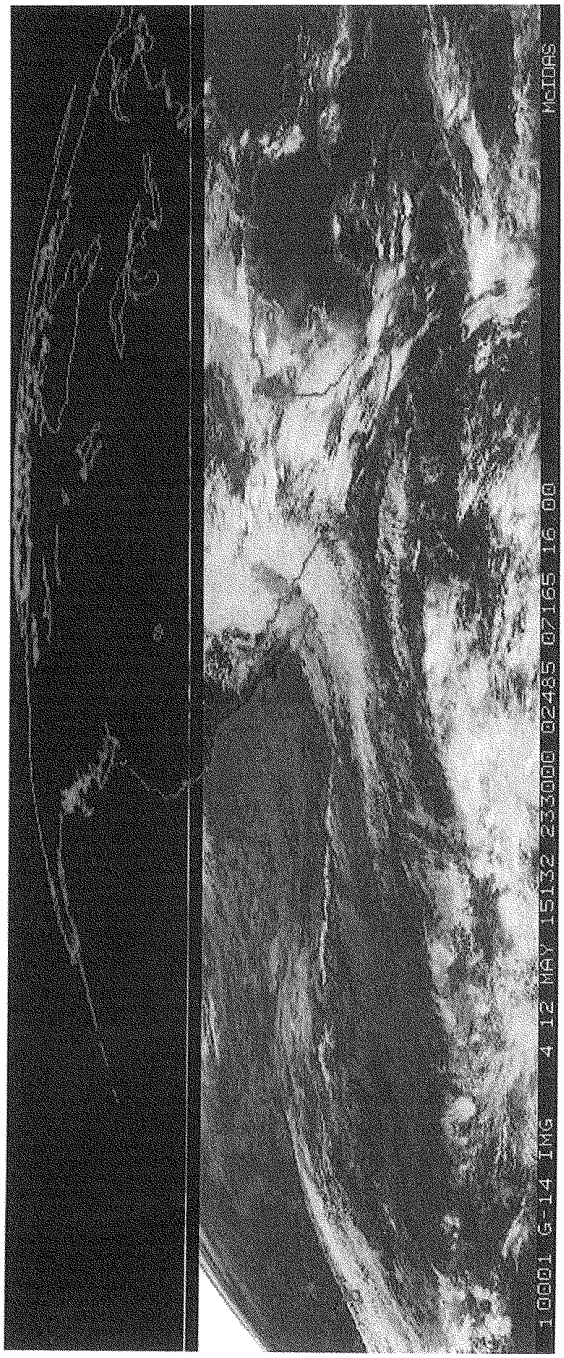
NWS will continue to meet FAA requirements. Given the improved short-term forecasts coming from all of our WFOs, we will be able to provide enhanced, more consistent aviation services nationally, not just at the demonstration sites.

These positions are not included in the current version of the NWS-FAA Interagency Agreement and the FAA has not identified these services as a requirement. FAA reimburses NWS for the CWSU meteorologists at 21 CWSUs and the current Interagency Agreement also supports six positions at the FAA Command Center.

Appendix II

Additional Material for the Record

May 12, 2015



October 22, 2015