

**A REVIEW OF THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION'S
FISCAL YEAR 2020 BUDGET REQUEST**

HEARING
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDRED SIXTEENTH CONGRESS

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C O N T E N T S

April 30, 2019

Hearing Charter	Page 2
Opening Statements	
Statement by Representative Lizzie Fletcher, Chairwoman, Subcommittee on Environment, Committee on Science, Space, and Technology, U.S. House of Representatives	9
Written statement	11
Statement by Representative Roger Marshall, Ranking Member, Subcommittee on Environment, Committee on Science, Space, and Technology, U.S. House of Representatives	13
Written statement	14
Statement by Representative Eddie Bernice Johnson, Chairwoman, Committee on Science, Space, and Technology, U.S. House of Representatives	16
Written statement	18
Statement by Representative Frank Lucas, Ranking Member, Committee on Science, Space, and Technology, U.S. House of Representatives	20
Written statement	21
Witness:	
The Honorable Neil Jacobs, Ph.D., Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere, NOAA	
Oral statement	23
Written statement	26
Discussion	31
Appendix I: Answers to Post-Hearing Questions	
The Honorable Neil Jacobs, Ph.D., Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere, NOAA	44

**A REVIEW OF THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION'S FISCAL
YEAR 2020 BUDGET REQUEST**

TUESDAY, APRIL 30, 2019

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

The Subcommittee met, pursuant to notice, at 10:03 a.m., in room 2318 of the Rayburn House Office Building, Hon. Lizzie Fletcher [Chairwoman of the Subcommittee] presiding.

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

***A Review of the National Oceanic and Atmospheric Administration's FY2020
Budget Request***

Tuesday, April 30, 2019
10:00 a.m.
2318 Rayburn House Office Building

PURPOSE

On Tuesday, April 30, 2019 at 10:00 am, the House Committee on Science, Space, and Technology's Subcommittee on Environment will hold a hearing to examine the President's Fiscal Year (FY) 2020 budget request for the National Oceanic and Atmospheric Administration (NOAA) and associated issues.

WITNESS

The Honorable Neil Jacobs, Ph.D., Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere, National Oceanic and Atmospheric Administration.

OVERARCHING QUESTIONS

- What would be the impact of the proposed budget on NOAA's ability to carry out its mission?
- What analysis did the Administration use in deciding what programs to prioritize and what to eliminate?
- Does this budget proposal support a consistent plan for NOAA in the long term?
- What would be the impact of the proposed budget on U.S. leadership in cutting edge oceanic and atmospheric research, remote-sensing, in-situ observations, weather forecasting and climate prediction, and the continued protection of life and property?

BACKGROUND

Overview of FY 2020 Budget Request for NOAA

The President's FY 2020 budget request for NOAA is \$4.5 billion in discretionary appropriations, an almost 18% decrease from the FY 2019 enacted levels. NOAA's mission is "to understand and predict changes in climate, weather, oceans and coasts; to share that

knowledge and information with others; and to conserve and manage coastal and marine ecosystems and resources.”¹

NOAA conducts research in atmospheric, coastal, and ocean sciences, climate and air quality, ecosystems, and fisheries and marine mammals. NOAA’s National Ocean Service (NOS) provides navigation support services and is responsible for mapping and charting coastal areas. Additionally, NOAA operates a constellation of satellites that provide critical data for weather and space weather forecasting, climate prediction, and earth and ocean science research through the National Environmental Satellite Data Information Service (NESDIS).

Table 1 shows the six primary NOAA line offices and Mission Support. All of the line offices, except for the National Marine Fisheries Service, as well as Mission Support services, fall within the House Science, Space, and Technology Committee’s jurisdiction. The Administration proposed cuts across the entire agency with decreases for individual line offices ranging from 0.7% to 41% below the FY 2019 enacted budget.

Table 1: NOAA FY 2020 Budget Request*

Program	FY 2019 Enacted ² (\$M)	FY 2020 Request ³ (\$M)	FYS Change (\$M)	FY 2020 Request % over FY 2019 Enacted (%)
National Ocean Service**	585.5	371.2	-214.2	-36.6%
National Marine Fisheries Service***	989.2	812.0	-177.2	-17.9%
Oceanic & Atmospheric Research	566.1	335.1	-230.9	-40.8%
National Weather Service	1,162.6	1,081.9	-80.7	-6.9%
National Environmental Satellite, Data, and Information Service	1,698.5	1472.7	-225.8	-13.3%
Mission Support	292.2	266.2	-26.0	-8.9%
Office of Marine and Aviation Operations	327.2	324.9	-2.4	-0.7%
TOTAL NOAA Discretionary	5,434.3	4,466.5	- 967.8	-17.8%

*Numbers may not add up due to rounding

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

*** National Marine Fisheries Service (NMFS) line office of NOAA is not within the jurisdiction of the Committee on Science, Space, and Technology

¹ NOAA mission and vision, <https://www.noaa.gov/our-mission-and-vision>

² Fiscal Year 2019 Consolidated Appropriations Act, 2019. (P.L. 116-6)

³ NOAA Fiscal Year 2020 Congressional Justification and Blue Book, <http://www.corporateservices.noaa.gov/nbol/>

National Ocean Service (NOS)

The National Ocean Service (NOS) enables safe, sustainable, and efficient use of marine and coastal resources through science-based products and services to support coastal communities and economies. NOS collects oceanographic data and maintains services such as navigation charts. NOS priorities include safe and efficient transportation and commerce; preparedness and risk reduction; and stewardship, recreation, and tourism. The FY 2020 request would reduce overall funding for NOS programs by \$214 million, or 37%, compared to the FY 2019 enacted budget. This includes significant reductions to extramural grants.

The proposed budget for the FY 2020 NOS Operations, Research and Facilities (ORF) accounts have a proposed net decrease of \$216.7 million from the FY 2019 enacted budget. The Navigation, Observations, and Position activity has proposed net reduction of \$36.5 million. This includes reductions in Integrated Ocean Observing System (IOOS) Regional Observation Grants. The Coastal Science and Assessment activity has a net decrease of \$42.4 million, which includes the termination of the National Centers for Coastal Ocean Science (NCCOS), as well as an elimination of the NCCOS competitive research program. The Ocean and Coastal Management and Services activity has a net decrease of \$138 million in program changes which includes the elimination of: Coastal Zone Management Grants, grants that support operations of the National Estuarine Research Reserve System (NERRS), federal funding support for Title IX of the National Oceans and Coastal Security Act, and the Regional Geospatial Monitoring Grant Program. The NOS Procurement, Acquisitions, and Constructions (PAC) request is \$1.5 million, a reduction \$2.4 million from FY 2019 enacted in program changes for NOS Construction Activity.

Office of Oceanic and Atmospheric Research (OAR)

NOAA's Office of Oceanic and Atmospheric Research (OAR) provides the research foundation for NOAA's activities in climate, weather, and oceans. OAR conducts the scientific research, environmental studies, and technology development necessary to improve NOAA's operations. OAR is key in improving weather forecasting through the transition of research to operations (R2O) related to weather models. Currently, OAR activities are carried out at seven NOAA laboratories, and through extramural research activities at 33 National Sea Grant colleges and universities in coastal states and territories. The FY 2020 budget request for OAR is \$335.1 million, which is a \$231 million, or almost 41%, decrease, from the FY 2019 enacted levels. The Administration's proposed budget would effectively dismantle NOAA's Climate Program Office, eliminate NOAA's funding support for the National Climate Assessment, close OAR's Air Resources Laboratory, terminate the National Sea Grant College Program, and severely reduce funding for, or eliminate, much of the critical climate, weather, atmospheric, and oceanographic research conducted at NOAA.

The FY 2020 OAR ORF budget request is \$309.2 million, which is a net decrease of \$221.6 million from the FY 2019 enacted budget. The program changes include: a \$67 million decrease in climate research including long-term observing, monitoring, research, and modeling capabilities; a \$34.1 million net decrease in Weather and Air Chemistry research which supports NOAA's efforts for

community-driven enhancements to weather models and accelerates the transition from research into forecasting at NWS; and a \$120.5 million net decrease in Ocean, Coastal and Great Lakes Research. The net decreases in the Weather and Air Chemistry Research activity and Ocean, Coastal and Great Lakes Research activity account for increased funding for the Earth Prediction Innovation Center (EPIC), and the Interagency National Oceanographic Partnership Program (NOPP) respectively. The Administration has requested a \$12.2 million for the Innovative Research and Technology activity to accelerate the adoption and transition of advance computing and technology throughout NOAA.

Some of the proposed OAR ORF program and activity eliminations, terminations, and reductions include: elimination of Arctic research within the Climate Laboratories and Cooperative Institutes and within the Regional Climate Data and Information activity; elimination of climate competitive research activities within the Regional Climate Data and Information activity which terminates the Regional Integrated Sciences and Assessments (RISA) program, and eliminates NOAA's portion of funding for the National Climate Assessment; elimination of Climate Competitive Research Subactivity which will terminate all research programs within the Climate Program Office, with the exception of the National Integrated Drought Information System (NIDIS), and would also reduce competitive grants to Cooperative Institutes, universities, NOAA laboratories and other partners; termination of the Vortex-Southeast (VORTEX-SE) program that works to improve tornado forecasts in the Southeastern U.S.; termination of R&D to improve severe weather detection with new airborne phased array radar (APAR); decreased funding for Climate Laboratories, Weather Laboratories, and Oceans, Coasts & Great Lakes Laboratories; decreased funding for Cooperative Institutes; decreased funding for the U.S. Weather Research Program; and decreased funding for the Joint Technology Transfer Initiative. Additional OAR ORF program and activity eliminations, terminations, and reductions, along with specific details and funding levels can be found in NOAA's FY 2020 Budget Bluebook.

The total FY 2020 OAR PAC Budget is \$26 million, a decrease of \$15 million from the FY 2019 enacted budget which accounts for the termination of NOAA's computing partnership with Mississippi State University.

National Weather Service (NWS)

The National Weather Service (NWS) is responsible for providing weather forecasts, watches, and warnings in order to protect life and property, and enhance the U.S economy. The FY 2020 request for NWS is \$1.082 billion, a reduction of \$80.7 million, or 6.9%, from the FY 2019 enacted level. Given the increase in severe weather events experienced across the United States in recent years, it is critical to ensure that NWS funding is sufficient to cover all operational and maintenance requirements for current weather forecasting equipment.

The FY 2020 request for the NWS ORF budget is \$989.3 million, a decrease of \$77.3 million from FY 2019 enacted budget. This includes a net decrease of \$17 million in Observations activities, a net decrease of \$12.2 million in the Central Processing activity; a net decrease of \$35.2 million for the Analyze, Forecast, and Support activity; a net decrease of \$0.4 million in Dissemination activity, which includes an increase of \$0.2 million for systems administration support at the National Center for Environmental Protection (NCEP) office; a net decrease of \$12.5 million for

Science and Technology Integration, which includes a \$1.3 million increase to restore grants for the Collaborative Science, Technology, and Applied Research (CSTAR) program and a \$2 million increase to test and make improvements to the National Blend of Models (NBM) as part of NWS's Collaborative Forecast Process (CFP).

The FY 2020 NWS ORF budget request proposes the elimination of the following programs and activities: elimination of the Tsunami Research and Operation Warning Program and merging the Pacific Tsunami Warning Center in Hawaii and the National Tsunami Warning Center in Alaska; termination of support for the NOAA Water Level Observation Network (NWLON) and the U.S. Geologic Survey Seismic network; and termination of aviation science research and development and research to operations (R2O) transition efforts. The Administration has provided support within the NWS ORF account for ship observation data buys and to realign the National Ice Center (NIC) from NESDIS to NWS.

The FY 2020 NWS PAC budget request of \$92.6 million is a net decrease of \$24.3 million from the FY 2019 enacted budget. The net decrease for the overall PAC budget is comprised of a reduction of \$10.4 million for Construction activity that supports repairs and renewal of forecast offices and other pieces of government owned weather infrastructure, and a reduction of \$13.9 million for Systems Acquisitions activity. The net decrease of the NWS PAC budget includes two planned reductions of the Service Life Extension Program (SLEP) for Next Generation Weather Radar (NEXRAD), and the SLEP for the Automated Surface Observing System (ASOS) infrastructure.

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

NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) develops, launches, and operates a constellation of satellites that provide critical earth and space observations that are used to generate forecasts for terrestrial and space weather. NESDIS also manages, distributes, and archives satellite and environmental data from NOAA and other partner satellites. The FY 2020 budget requests \$1.5 billion for NESDIS, a \$226 million, or 13%, reduction below the FY 2019 enacted budget.

The FY 2020 NESDIS ORF budget request is \$271.6 million, an \$8.6 million decrease from the FY 2019 enacted budget. The NESDIS ORF budget is divided into two accounts: Environmental Satellite Observing Systems and NOAA's National Centers for Environmental Information (NCEI). The Environmental Satellite Observing Systems account contains programmatic funding for management, processing, analyzing, and archiving the data received from all of NOAA's weather monitoring equipment, both in-situ and space-based. NOAA's NCEI is responsible for hosting and providing public access to its archives of environmental data.

The Environmental Satellite Observing Systems activity request for FY 2020 is \$215 million, a net decrease of \$3.9 million from the FY 2019 enacted budget, to provide continued support to satellite systems. The NCEI account funds data processing and analyses at NOAA's major data centers located in Asheville, NC, Boulder, CO, Silver Spring, MD, and Stennis Space Center, MS. The FY 2020 NCEI budget request of \$56.6 million is a decrease of \$4.6 million from the FY 2019

enacted budget. The NESDIS ORF budget includes a proposal to eliminate the Regional Climate Centers (RCCs) that provide climate services specific to the regions in which they are located.

The NESDIS PAC budget is primarily focused on acquisitions for NOAA's weather satellite systems: the polar weather satellites that orbit the earth and provide information for medium to long-range weather forecasts; and the geostationary operational environmental satellites (GOES) which gather data above a fixed position on the earth's surface and provide information for short-range warnings and current weather conditions. To maintain continuity of weather forecasting data as older satellites retire, a new series of satellites is being developed for both systems. Changes in the NESDIS PAC account reflect the different phases of satellite acquisition. The FY 2020 NESDIS PAC budget request is \$1.2 billion, reflecting a net decrease of \$210.3 million from the FY 2019 enacted budget. The NESDIS PAC budget is broken into the Systems Acquisition activity and the Construction Activity. The Systems Acquisition activity has a request of \$1.2 billion, a net decrease of \$210 million below FY 2019 enacted, which includes an increase of \$2.3 million for joint venture partnership allowing for NOAA's to leverage and partner with NASA's Earth Science and Heliophysics programs, and an increase of \$10 million to conduct industry studies and analysis to optimize ways to meet future needs for a geostationary orbit which was informed by the results of NOAA's Satellite Observing System Architecture (NSOSA) study. The Construction activity is flat funded at \$2.5 million.

Following the successful launch of the Joint Polar Satellite System-1 (JPSS-1, now NOAA-20) in 2017, and the launch of the GOES-17 (formerly GOES-S, now operationally GOES-West) in 2018, the FY 2020 NESDIS PAC budget had a planned decrease for the polar weather satellites and GOES-R series, among other planned satellite decreases. These planned budget decreases include: polar weather satellite decrease of \$103 million, GOES-R series decrease of \$104.3 million, Metop decrease of \$9.3 million, Cooperative Data and Rescue Services (CDARS) decrease of \$11.7 million. The FY 2020 request for the NESDIS PAC budget also reduces funding for space weather and the commercial weather data pilot, and transitioning to common products and services for ground systems support for NOAA satellites. NESDIS is also currently restructuring its PAC budget down to eight subactivities to better align with future architecture and observing system implementation.

Mission Support (MS)

Mission Support (MS) provides services that support NOAA's execution of its mission which includes corporate services and agency management. MS includes the Office of the Chief Information Officer, the Acquisition and Grants Office, and the Office of Human Capital Services. The MS request for FY 2020 is \$266.2 million, a net decrease of \$26 million, or 9%, from the FY 2019 enacted levels.

The MS ORF budget for FY 2020 is \$261.2 million, a net decrease of \$17.5 million. This includes an increase of \$0.74 million for Executive Leadership activity, and an increase of \$4.3 million for the Mission Services and Management activity which includes funds for the consolidation of NOAA's presences at the Silver Spring Metro Center Campus, and support for critical upgrades to NOAA's Commerce Business System for financial hardware and software. The IT Security activity request for FY 2020 is a \$4.97 million increase over the FY 2019 enacted levels to support

bureau-level oversight of cybersecurity at all six NOAA line offices to establish an enterprise-wide Internal Risk Mitigation capability within its Cyber Security Program. An increase of \$8.5 million was requested for FY 2020 for NOAA's payment to the DOC Working Capital Fund activity for a total of \$62.1 million. The FY 2020 request nearly eliminates NOAA's Office of Education with a net decrease of \$20 million from FY 2019 enacted levels, providing a total funding level for Office of Education programs of \$1.0 million for FY 2020. This includes the elimination of funding for the Competitive Educational Grants Program, and the Educational Partnership Program for Minority Serving Institutions, and a reduction in the remaining funds for the Office of Education by \$1.0 million. NOAA's Office of Education would remain the primary point of contact for the National Science and Technology Council's (NSTC)'s Committee on STEM for NOAA and the Department of Commerce. Additionally, the FY 2020 budget proposes the elimination of NOAA's Bay-Watershed Education and Training (B-WET) Regional Program. The MS PAC request for FY 2020 of \$5.0 million includes a net decrease of \$20 million from the FY 2019 enacted levels in the NOAA Construction activity to reflect completion of construction of the Mukilteo Research Station in Washington State.

Office of Marine and Aviation Operations (OMAO)

The Office of Marine and Aviation Operations (OMAO) manages and operates NOAA's active fleet of 16 research and survey ships and nine specialized aircraft that gather oceanic, atmospheric, hydrographic, and fisheries data to support the agency's mission. OMAO is made up of officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States, as well as civilians. The FY 2020 request for OMAO of \$327.2 million is a reduction of \$2.4 million, or 0.7%, from the FY 2019 enacted budget.

The OMAO ORF account is primarily responsible for operations and maintenance of OMAO's fleet of ships and aircraft, and the FY 2020 budget saw a net increase of \$1.1 million over the FY 2019 enacted budget. The Marine Operations and Maintenance activity has a net decrease of \$1.8 million. The Aviation Operations and Aircraft Services activity has a net decrease of \$1.1 million. The FY 2020 budget establishes a new budget line for the Unmanned System Operations activity, funded at \$4 million. The OMAO PAC budget, which supports OMAO's fleet recapitalization plan, had a proposed decrease of \$7.7 million in the Marine and Aviation Capital Investments activity.

Chairwoman FLETCHER. This hearing will come to order.

Without objection, the Chair is authorized to declare a recess at any time.

Good morning. Welcome to today's hearing entitled, "A Review of the National Oceanic and Atmospheric Administration's Fiscal Year 2020 Budget Request." I would like to welcome Dr. Neil Jacobs to the Committee and thank him for coming to testify today on the President's budget request for Fiscal Year 2020 for the National Oceanic and Atmospheric Administration, NOAA.

NOAA's mission is to "understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources." NOAA strives to meet this mission through its six line offices that collect environmental observations through satellites and specialized marine vessels and aircraft; analyze, store, and disseminate this data; provide weather forecasts and climate predictions; protect our coastal and marine resources; and conduct cutting-edge scientific research.

Many Americans utilize NOAA's publicly available data on a daily basis. That is why NOAA's budget request for Fiscal Year 2020 of \$4.5 billion, an almost 18 percent decrease from the \$5.4 billion provided in the Fiscal Year 2019 enacted budget, is deeply alarming. Every line office within NOAA received net decreases to their top-line budgets, with significant cuts to both NOAA research programs and extramural research grants.

Many of our constituents are already dealing with impacts of climate change, such as sea-level rise, heavy rainfall, and rising temperatures in both our oceans and atmosphere. The National Climate Assessment, a congressionally mandated report published by the U.S. Global Change Research Program, describes these and other risks and impacts arising from climate change across the United States, in addition to examining the latest climate science. The U.S. Global Change Research Program is supported by funding contributions from the Federal member agencies.

The increased frequency of severe weather events that are impacting every part of the country is also described in the National Climate Assessment. We must continue to support efforts to enhance both our weather forecasting and climate prediction capabilities, which are based on long-term records of environmental observation. Across-the-board funding cuts endanger NOAA's ability to continue to collect, analyze, store, and disseminate this critical data. In order to sustain this data stream, we must provide robust and consistent funding for data collected by in-situ and remote-sensing platforms.

The U.S. has been the leader in weather forecasting and climate prediction not only because of our cutting-edge weather models, but also our uninterrupted record of environmental observations and measurements that span decades, which feed our models and help provide better, more accurate forecasts. Additionally, NOAA has seen large improvements in forecasts by focusing on the transition of weather research conducted at line offices such as the Office for Oceanic and Atmospheric Research, to operations at the National Weather Service.

The draconian cuts of over 40 percent to the Office of Oceanic and Atmospheric Research would include the complete elimination of NOAA's portion of funding for the National Climate Assessment. These funding cuts would also significantly reduce both intramural and extramural research, and slow down the critical research to operations transition.

Stakeholders in decisionmaking roles at State and local levels, including emergency managers, utilize many of the products and services developed across NOAA. When Hurricane Harvey hit my district in 2017, the National Hurricane Center provided direct support to on-the-ground emergency managers and to other decisionmakers in Houston and across Texas and Louisiana.

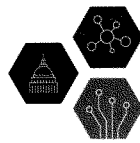
The National Weather Service also issued its first-ever storm surge watches and warnings during Harvey. These storm surge watches and warnings had been under development over the past several years. It is important to note that there were no storm-surge related deaths from Hurricane Harvey, a category 4 hurricane. The proposed cuts in this budget to the National Weather Service could negatively impact these existing successful interactions with local stakeholders.

The benefits of a well-funded NOAA are clear, which is why I am concerned that the widespread cuts proposed in this budget will impact NOAA's ability to meet its mission. Consistent and reliable funding is required to make significant improvements to our weather and climate models, which can be decades in the making, and ensure continuous collection of environmental observations.

I'm glad to know that Congress will have the final say on the budgets of Federal agencies so that we can ensure that NOAA can continue to meet its critical mission by providing robust funding to an agency that touches the lives of every American on a daily basis. I hope today's discussion will shed some light on how this budget will help support NOAA's long-term priorities.

I look forward to a productive discussion with Dr. Jacobs to better understand the Administration's justification for its proposed Fiscal Year 2020 budget for NOAA. Thank you.

[The prepared statement of Chairwoman Fletcher follows:]



U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON **SCIENCE, SPACE, & TECHNOLOGY**

Opening Statement

Chair Lizzie Fletcher (D-TX)
of the Subcommittee on Environment

Subcommittee on Environment:
A Review of the NOAA Fiscal Year 2020 Budget Request
April 30, 2019

Good morning. I would like to welcome Dr. Neil Jacobs to the Committee and thank him for coming to testify today on the President's Budget Request for Fiscal Year 2020 for the National Oceanic and Atmospheric Administration, or NOAA.

NOAA's mission is to "understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources." NOAA strives to meet this mission through its six line offices that collect environmental observations through satellites and specialized marine vessels and aircraft, analyze, store and disseminate this data, provide weather forecasts and climate predictions, protect our coastal and marine resources, and conduct cutting-edge scientific research.

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The benefits of a well-funded NOAA are clear, which is why I am concerned that the widespread cuts proposed in this budget will impact NOAA's ability to meet its mission. Consistent and reliable funding is required to make significant improvements to our weather and climate models, which can be decades in the making, and ensure continuous collection of environmental observations.

I am glad to know that Congress will have the final say on the budgets of federal agencies so that we can ensure that NOAA can continue to meet its critical mission by providing robust funding to an Agency that touches the lives of every American on a daily basis. I hope today's discussion will shed some light on how this budget will help support NOAA's long term priorities.

I look forward to a productive discussion with Dr. Jacobs to better understand the Administration's justification for its proposed FY 2020 budget for NOAA.

Thank you.

Chairwoman FLETCHER. The Chair now recognizes Ranking Member Marshall for an opening statement.

Mr. MARSHALL. Thank you, Chairwoman Fletcher, for holding this hearing today. It is important that we, as Members of Congress, remember it's the responsibility of Congress to vet budget requests, hear from the relevant agency leaders, and make the final decision on funding levels.

I also want to add my thanks to Dr. Neil Jacobs for being here today and for his continued service. Coming from the private sector, Dr. Jacobs brings a unique and valuable perspective to NOAA. On top of that, he's graciously taken on the responsibility of being the acting head of NOAA, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere.

NOAA has a wide-ranging mission from fisheries management to atmospheric observation. Their products and services have a tremendous economic impact and affect more than one-third of America's gross domestic product.

As we've heard, the President's budget request for NOAA is \$5.4 billion, an 18 percent decrease from last year's enacted funding. Like all other agencies and departments, NOAA was forced to make tough decisions, but the budget request reflects an attempt to be more efficient in its delivery of services in a constrained budgetary environment.

One area I'm pleased to see prioritized is NOAA's research in improving forecasting. America's leadership has slipped in severe weather forecasting, and European weather models routinely predict America's weather better than we can. Critical weather data is a lifeline for many of my constituents that make their living in the agriculture industry.

This spring, NOAA's National Severe Storms Laboratory will join with several partners in the Environmental Profiling and Initiation of Convection, or EPIC, field project. I'm particularly interested to hear how this project, authorized by this Committee last Congress and supported in the President's budget proposal, could have an impact on agriculture and production.

I do have some modest concerns about the growth of NOAA's satellite division, the National Environmental Satellite Data Information Services, or NESDIS. At \$1.4 billion, or roughly 33 percent of NOAA's total R&D budget, it's the largest and highest-funded area. Not too long ago, in 2008, the satellite budget came in at under \$1 billion. Let me say, I do think this increase is warranted, as NESDIS provides critical data and services, but we must ensure the office is equipped to handle this booming growth and use all resources in the most efficient way.

NOAA is a mission-oriented agency, and this Committee supports these core priorities. We face fiscal constraints that force us to make difficult choices about our science and technology services. I believe that this Committee, regardless of a political affiliation, should always support NOAA's desire to emphasize protecting life and property.

Thank you, and I yield back.

[The prepared statement of Mr. Marshall follows:]



COMMITTEE ON

SCIENCE, SPACE, AND TECHNOLOGY

REPUBLICANS Frank Lucas, Ranking Member

Opening Statement of Energy Subcommittee Ranking Member Roger Marshall
Environment Subcommittee Hearing: A Review of the NOAA Fiscal Year 2020
Budget Request

April 30, 2019

Thank you, Chairwoman Fletcher, for holding this hearing today. It is important that we, as Members of Congress, remember it is the responsibility of Congress to vet budget requests, hear from the relevant agency leaders, and make the final decision on funding levels.

I also want to thank Dr. Neil Jacobs for being here today and for his continued service. Coming from the private sector, Dr. Jacobs brings a unique and valuable perspective to NOAA. On top of that, he has graciously taken on the responsibility of being the acting head of NOAA, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere.

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NOAA is a mission-oriented agency, and this Committee supports these core priorities. We face fiscal constraints that force us to make difficult choices about our science and technology resources. I believe that this Committee, regardless of political affiliation, should always support NOAA's desire to emphasize protecting life and property.

As I mentioned before, the president's budget proposal is just that, a budget proposal. It's ultimately up to Congress to decide at what level NOAA is funded. The testimony today will help the Committee be more informed about NOAA's work and why the Administration made certain decisions.

###

Chairwoman FLETCHER. Thank you, Mr. Marshall.

The Chair now recognizes the Chairwoman of the full Committee, Ms. Johnson, for 5 minutes.

Chairwoman JOHNSON. Thank you very much, Chair Fletcher, and good morning, everyone. I'd like also to welcome Dr. Jacobs and thank him for being here today to testify on NOAA's Fiscal Year 2020 budget request.

For decades, NOAA's research and services have played a critical role in protecting American lives through accurate weather forecasting and climate prediction, improving our environmental knowledge and stewardship, and supporting a thriving United States economy. It seems obvious to say that the NOAA budget should reflect its mission and ensure NOAA can fulfill its obligations to the American people.

NOAA's mission is "to understand and predict changes in climate, weather, oceans, and coasts; to share that knowledge and information with others; and to conserve and manage coastal and marine ecosystems and resources." Yet NOAA's budget request for Fiscal Year 2020 is \$1 billion lower than its current budget, which is an 18 percent reduction. These cuts are felt across nearly every program and activity across the agency. This budget would also terminate approximately 547 civilian positions. How will NOAA deliver on its mission with these drastic cuts?

We don't have time to go into every detail, so I'd like to use part of my time to highlight some of the greatest concerns. The first is with NOAA's delivery on climate research. Climate change is real and happening right now. Rising temperatures and sea levels, and changes in ocean chemistry and ecosystems, pose a real threat to public health. These climate impacts also affect the management of our fisheries and coasts and the overall resiliency of our communities to extreme weather events. NOAA's activities, tools, and services are central to our ability to understand, to adapt to, and mitigate the impacts of a changing climate.

As climate and severe weather events increase in frequency and intensity, so do the costs to human lives and the economy. In 2017, a record-breaking year, the U.S. had 16 weather and climate events that each cost at least \$1 billion and a total cost of \$300 billion and 362 fatalities. This budget proposes to cut almost \$500 million from its climate laboratories and cooperatives—institutes and nearly dismantles NOAA's Climate Program Office. How will this impact the ability of communities across the United States to prepare for and respond to climate change and severe weather?

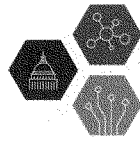
It also proposes to eliminate the agency's funding for the National Climate Assessments. These assessments represent years of work and extensive review. In our first full Committee hearing on the State of Climate Science, we heard from experts who contributed to the Fourth National Climate Assessment. What does it mean when the leading Federal agency studying the climate drops out of the main Federal report on climate change? I look forward to hearing from Dr. Jacobs on how NOAA intends to continue working on this congressionally mandated report without any dedicated funding for it.

I recognize that Dr. Jacobs was given a tough budget proposal from the Administration and had to make some difficult decisions.

But we need to think about the lives at risk, and the potential economic and environmental harm of such a reduced budget.

I thank you, Madam Chair, and I yield back.

[The prepared statement of Chairwoman Johnson follows:]



U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY

Opening Statement

Chairwoman Eddie Bernice Johnson (D-TX)

Subcommittee on Environment:
A Review of the NOAA Fiscal Year 2020 Budget Request
 April 30, 2019

Thank you, Chair Fletcher. I would also like to welcome Dr. Jacobs and thank him for being here today to testify on NOAA's Fiscal Year 2020 budget request.

For decades, NOAA's research and services have played a critical role in protecting American lives through accurate weather forecasting and climate prediction, improving our environmental knowledge and stewardship, and supporting a thriving United States economy. It seems obvious to say, but the NOAA budget should reflect its mission and ensure NOAA can fulfill its obligations to the American people.

NOAA's mission is "to understand and predict changes in climate, weather, oceans and coasts; to share that knowledge and information with others; and to conserve and manage coastal and marine ecosystems and resources."

Yet NOAA's budget request for Fiscal Year 2020 is \$1 billion lower than its current budget, which is an 18% reduction. These cuts are felt across nearly every program and activity across the agency. This budget would also terminate approximately 547 civilian positions. How will NOAA deliver on its mission with these drastic cuts?

We don't have time to go into every detail, so I'd like to use part of my time to highlight some of my greatest concerns.

The first is with NOAA's delivery on climate research. Climate change is real and happening right now. Rising temperatures and sea levels, and changes in ocean chemistry and ecosystems, pose a real threat to public health. These climate impacts also affect the management of our fisheries and coasts, and the overall resiliency of our communities to extreme weather events. NOAA's activities, tools, and services are central to our ability to understand, adapt to, and mitigate the impacts of a changing climate.

As climate and severe weather events increase in frequency and intensity, so do the costs to human lives and the economy. In 2017, a record-breaking year, the U.S. had 16 weather and climate events that each cost at least \$1 billion for a total cost of over \$300 billion and 362 fatalities. This budget proposes to cut almost \$500 million from its climate laboratories and cooperative institutes and nearly dismantles NOAA's Climate Program Office. How will this

impact the ability of communities across the United States to prepare for and respond to climate change and severe weather?

It also proposes to eliminate the agency's funding for the National Climate Assessments. These Assessments represent years of work and extensive review. In our first Full Committee hearing on the "State of Climate Science," we heard from experts who contributed to the Fourth National Climate Assessment. What does it mean when the leading federal agency studying the climate drops out of the main federal report on climate change? I look forward to hearing from Dr. Jacobs how NOAA intends to continue working on this Congressionally mandated report without any dedicated funding for it.

I recognize that Dr. Jacobs was given a tough budget proposal from the Administration and had to make some difficult decisions. But we need to think about the lives at risk, and the potential economic and environmental harm, of such a reduced budget.

Thank you, Madam Chair, and I yield back the balance of my time.

Chairwoman FLETCHER. Thank you, Chairwoman Johnson.

The Chair now recognizes the Ranking Member of the full Committee, Mr. Lucas, for an opening statement.

Mr. LUCAS. Thank you, Chairwoman Fletcher, for holding this hearing on NOAA's FY2020 budget request. NOAA has a broad array of responsibilities, ranging from weather forecasting and climate prediction to ocean and atmospheric observation. NOAA's work benefits America's farmers, ranchers, coastal communities, disaster personnel, land-use planners, weather forecasters, and Americans across the country. NOAA's research and publicly available data has immense economic impact.

The President's budget proposal for NOAA reflects difficult decisions made across the Federal Government. I appreciate the effort of the Administration to submit a proposal that emphasizes NOAA's core priorities, principally, protecting life and property. Beyond these basic functions, NOAA is prioritizing other areas within its jurisdiction, including improving agency efficiencies for satellite management, maximizing the economic contributions of our coastal and marine resources, and reducing the impacts of extreme weather incidents.

We have heard concerns about some of the proposed cuts included in this request. I would remind my colleagues that the President's budget request is just a starting point for our discussions, and we're here today to learn more about how to best prioritize NOAA's resources. It's also important to note that in recent years Congress has decided to fund NOAA at a higher level than the President's budget request.

Many of our constituents are interested in NOAA's work, particularly the National Weather Service. Oklahoma is home to cutting-edge research on weather forecasting and climate prediction. Last month, I had the opportunity to tour the University of Oklahoma and Oklahoma State to learn about the research being conducted in partnership with NOAA.

I also toured the National Weather Center in Oklahoma and heard from many dedicated researchers working to improve our weather forecasting abilities. There was one unmistakable conclusion from this trip: The work done by the National Weather Service is very important and must be a focus of this Committee's work in this Congress.

As a rancher—and, in all fairness, my wife prefers to refer to me as a farmer; she's the rancher—I can tell you that accurate weather prediction is critical for our Nation's agricultural producers. So I have a keen interest in the Committee's work to help improve weather forecasting. During the 115th Congress, this Committee passed my *Weather Research and Forecasting Innovation Act of 2017*, which was subsequently passed into law and is being implemented by NOAA. I look forward to hearing about NOAA's continued implementation efforts for this Act.

I want to thank Dr. Jacobs for appearing before the Subcommittee today. His enthusiasm for his work is apparent, and he brings a unique perspective to NOAA's leadership thanks to his extensive experience in the private sector.

Madam Chairwoman, I yield back the balance of my time.

[The prepared statement of Mr. Lucas follows:]



Opening Statement of Ranking Member Frank Lucas

Environment Subcommittee Hearing: A Review of the NOAA Fiscal Year 2020 Budget Request

April 30, 2019

Thank you, Chairwoman Fletcher, for holding this hearing on NOAA's FY20 budget request. NOAA has a broad array of responsibilities ranging from weather forecasting and climate prediction, to ocean and atmosphere observation. NOAA's work benefits America's farmers and ranchers, coastal communities, disaster personnel, land use planners, weather forecasters, and Americans across the country. NOAA's research and publicly available data has an immense economic impact.

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I look forward to hearing about NOAA's continued implementation efforts for this act.

I want to thank Dr. Jacobs for appearing before the subcommittee today. His enthusiasm for his work is apparent and he brings a unique perspective to NOAA's leadership thanks to his extensive private sector experience. Madame Chairwoman, I yield back.

###

Chairwoman FLETCHER. Thank you, Mr. Lucas.

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

At this time, I would like to introduce our witness. Dr. Neil Jacobs was confirmed as the Assistant Secretary of Commerce for Environmental Observation and Prediction in February 2018. He's been performing the duties of Under Secretary of Commerce for Oceans and Atmosphere since February 2019.

Prior to joining NOAA, Dr. Jacobs was the Chief Atmospheric Scientist at Panasonic Avionics Corporation. He was also previously the Chair of the American Meteorological Society's Forecast Improvement Group and served on the World Meteorological Organization's aircraft-based observing team.

Dr. Jacobs has a bachelor's degree in mathematics and physics from the University of South Carolina and a master's and doctoral degree in atmospheric science from North Carolina State University.

Dr. Jacobs, you will have 5 minutes for your spoken testimony. Your written testimony will be included in the record for the hearing. When you've completed your spoken testimony, we will begin with questions. Each Member will have 5 minutes to question you.

Dr. Jacobs, you may begin your testimony.

**TESTIMONY OF DR. NEIL JACOBS,
ASSISTANT SECRETARY OF COMMERCE FOR
ENVIRONMENTAL OBSERVATION AND PREDICTION,
PERFORMING THE DUTIES OF UNDER SECRETARY
OF COMMERCE FOR OCEANS AND ATMOSPHERE, NOAA**

Dr. JACOBS. Chairwoman Fletcher, Ranking Member, Members of the Committee, thank you for the opportunity to testify today.

The President's FY2020 budget request for NOAA is \$111 million above the FY2019 request and emphasizes core programs while making targeted investments, which we believe will produce a substantial return for the American taxpayer.

Accelerating advancements in global modeling program is a top priority. While there have been many achievements in 2018, problems exist with the current structure of weather research to operations. The internal and external strategy is fractured, the computing procurement process is cumbersome, and the funding process disincentivizes collaboration. The FY2020 request addresses many of these challenges through the creation of the Earth Prediction Innovation Center, or EPIC.

Based on the *Weather Research and Forecast Innovation Act of 2017* and recently authorized in the *National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018*, EPIC will serve as a hub for building and maintaining a true community model. EPIC's innovative structure will link scientists and software engineers in academia, private industry, and partner agencies with research, development, and operational activities inside of NOAA. EPIC will significantly enhance our ability to access external expertise, reestablishing preeminence of U.S. forecast model skill,

and improving our ability to provide accurate watches and warnings.

The NOAA Satellite Observing System Architecture study, or NSOSA, which was completed in 2017, analyzed various approaches to better meet mission requirements of greater flexibility, responsiveness, and incorporate and involve—evolving technologies. Congress recognized the importance of NSOSA, codifying the program in the *NIDIS Reauthorization Act of 2018*. The budget initiates NSOSA implementation with investments to evaluate innovative space-based solutions and partnerships, including \$12.3 million for joint venture partnerships and hosted payloads on geostationary and polar orbits. It also continues the importance of the Commercial Weather Data Pilot program, as well as \$5 million for the option to purchase data after successful testing.

This budget makes necessary investments for strong coastal communities and economies and includes an increase in \$2.3 million for regional fishery management councils to analyze and remove outdated or ineffective regulations. To help level the playing field for U.S. commercial fishermen in the global seafood marketplace, an additional \$1.6 million is requested to enforce the Seafood Import Monitoring Program and prevent the importation of seafood caught using illegal fishing practices.

Finally, the budget includes an increase of \$3.6 million to support aquaculture by assisting industry with regulatory compliance, conducted research, and insured American-farmed fish are safe and sustainable.

Executive Order 13840 established a National Ocean Policy focused on providing tools to coastal communities to substantially manage their offshore waters. The budget includes an additional \$4 million for ocean data platforms, building on innovative tools developed by NOAA to improve siting of offshore activities.

NOAA has made great strides in the past 2 years to reduce the amount of time needed for environmental review. The time to complete formal and informal *Endangered Species Act* consultations was reduced by over 22 and 65 percent, respectively. Incidental harassment authorizations under the *Marine Mammal Protection Act* have been reduced by 25 percent. The FY2020 budget builds on this success by providing an additional \$3 million to further reduce the timeline for consultations and permits.

Other sections in the Blue Economy that this budget addresses include marine transportation through additional precision navigation data, efforts to reduce marine debris, accelerating economic benefits of the new and expanded marine sanctuaries, and reducing the backlog of natural resource damage assessment cases.

Finally, this budget includes \$5 million for the National Oceanographic Partnership Program. We intend to use these funds to leverage investments from other Federal agencies, private industry, philanthropic organizations that have shared interest in advancing ocean research. These funds can be used for a variety of partnerships ranging from ocean exploration to new technology to detect and protect marine mammals.

NOAA's services touch every American every day. I believe this budget request meets NOAA's core mission of protecting lives and

property, while also positioning the agency to be more effective in moving forward.

Thank you again for the opportunity to testify today. I would be pleased to answer any questions you may have.

[The prepared statement of Dr. Jacobs follows:]

**WRITTEN STATEMENT OF
DR. NEIL JACOBS, PH.D.
ASSISTANT SECRETARY OF COMMERCE FOR ENVIRONMENTAL
OBSERVATION AND PREDICTION,
PERFORMING THE DUTIES OF UNDER SECRETARY OF COMMERCE FOR
OCEANS AND ATMOSPHERE**

**ON THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S
FY 2020 BUDGET REQUEST**

**BEFORE THE
HOUSE COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
SUBCOMMITTEE ON ENVIRONMENT**

April 30, 2019

Chairwoman Fletcher, Ranking Member Marshall, and Members of the Committee, thank you for the opportunity to testify today regarding the President's FY 2020 budget request. The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) appreciates the continued support of Congress, the Administration, and our broad and diverse base of stakeholders. The President's FY 2020 budget request continues to emphasize core programs while making targeted investments to innovate across NOAA's line offices. We continue to monitor major milestones and accomplishments of our programs and activities to evaluate progress and demonstrate success.

FY 2020 BUDGET REQUEST

NOAA's FY 2020 budget request of approximately \$4.5 billion is focused on supporting NOAA's mission and advancing NOAA's highest priorities, which are: 1) To reduce the impacts of extreme weather and water events to save lives and protect property by implementing the Weather Research and Forecasting Innovation Act, 2) To maximize the economic contributions of ocean and coastal resources, and 3) To advance space innovation.

Reduce the Impacts of Extreme Weather and Water Events

The President's FY 2020 budget request will accelerate the advancements in the U.S. global weather modeling program, which is a top priority for the Administration, the Department of Commerce, and NOAA. In 2018, NOAA exceeded its target of transitioning research and

development products, moving 24 products to application or operations. However, despite these advancements, significant impediments exist within the current structure of weather research to operations. The internal and external strategy is fractured, the procurement process for high-performance computing capacity is cumbersome, and the funding process disincentivizes collaboration, and does not support innovation, sustained computing capacity, and competition. The FY 2020 request addresses many of these challenges with an increase \$12.3 million for a total of \$15.0 million for the Earth Prediction Innovation Center (EPIC).

Building on the tenets of the *Weather Research and Forecasting Innovation Act of 2017* (P.L. 115-25 and recently authorized in the *National Integrated Drought Information System Reauthorization Act of 2018* (P.L. 115-423), EPIC is a virtual center that will serve as the core research-to-operations-to-research hub for building and maintaining a community modeling framework. EPIC's innovative structure will link world-class scientists and software engineers in academia, the private sector, and partner agencies with the research, development, and operational activities inside the agency. EPIC will significantly amplify NOAA's ability to access expertise on a national scale, reestablishing preeminence of the U.S. operational forecast skill and enhancing its ability to provide accurate warnings of weather-based threats.

Maximizing the Economic Contributions of Ocean and Coastal Resources

Our nation's blue economy—comprised of fishing, shipping, tourism, energy development, and other industries tied to the ocean—is a critical contributor to the nation's overall economy. Thus, maximizing the economic contributions of ocean and coastal resources is a high priority for NOAA and the FY 2020 budget makes the necessary investments for strong coastal communities and economies. This Administration's Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States (Executive Order 13840), established a National Ocean Policy focused on making available data so that states, coastal communities, and industry can make informed decisions to sustainably manage their offshore waters. The budget includes an additional \$4 million for regional ocean data portals, building on innovative tools being developed by NOAA's National Ocean Service to improve siting for offshore activities such as aquaculture, fishing, and energy development.

The FY2020 budget also makes investments in our fishermen and seafood production. The budget includes an investment for regional fishery management councils to analyze and remove outdated, unnecessary or ineffective regulations. To further help level the playing field for U.S. commercial fishermen in the global seafood marketplace, the budget includes an additional \$1.6 million to enforce the Seafood Import Monitoring Program and prevent the importation of seafood caught using fishing practices that are illegal in the United States. Finally, the budget includes an investment to support aquaculture production by assisting industry with regulatory compliance and conducting priority research to ensure that American farmed seafood is healthy, safe and sustainable.

In addition, NOAA has made great strides in the past two years to reduce the amount of time needed for our environmental reviews. In comparison to pre-2018, the time to complete informal Endangered Species Act (ESA) consultations was reduced by over 65 percent; formal ESA consultations by 22 percent; incidental harassment authorizations under the Marine Mammal Protection Act (MMPA) by 25 percent; and the time to get a research permit for ESA-listed species by 29 percent. The FY 2020 budget builds on this success by investing to reduce the timeline for consultations and permits under the ESA and the MMPA.

Other sectors in the blue economy aided by increases in this budget include marine transportation through a centralized portal for data that can inform non-Federal development of precision navigation tools and products; unmanned systems, increased efforts to reduce marine debris; accelerating the economic benefits of new and expanded marine sanctuaries; and reducing the backlog of Natural Resource Damage Assessment cases.

Finally, this budget includes \$5 million for the National Oceanographic Partnership Program. We intend to use these funds to leverage other internal NOAA funds as well as leverage investments from other federal agencies, private industry, and philanthropic organizations that have shared interest in advancing the highest priority ocean research. These funds can be used for a wide variety of partnerships including ranging from ocean exploration to new technology development to detect and protect marine mammals.

Space Innovation

The FY 2020 request also supports the Department of Commerce and NOAA's Space Innovation priority and begins the multi-year process of innovating the architecture of NOAA's space based earth observations. Since the launch of the first operational satellite in 1970, satellite observations have been central to meeting NOAA's mission to understand and predict changes in climate, weather, oceans and coasts. Today, NOAA relies on satellites to monitor and forecast changes in terrestrial and space weather, the state of the oceans and coastlines, and the regional and global climate. Evolving to a more mission-effective, integrated, adaptable, agile, and affordable architecture of NOAA's space based earth observations will allow NOAA to respond to changing technology, emerging partnerships, and evolving observation requirements. The NOAA Satellite Observing System and Architecture Study (NSOSA) analyzes various innovative approaches to better meet NOAA's mission requirements, with greater flexibility and responsiveness to evolving technologies, and leveraging new business relationships with the private sector. Congress recognized the importance of NSOSA, codifying the program in the *National Integrated Drought Information System Reauthorization Act of 2018*.

The President's FY 2020 budget supports the implementation of NSOSA by proposing to restructure NOAA's satellite budget organized around observation portfolios rather than individual missions, an approach that will better leverage partnerships, be more agile to user

needs, and manage risks across portfolios to lower risks and ultimately reduce costs. The FY 2020 Budget also proposes investments to test and evaluate innovative space based solutions and partnerships in the polar and geostationary orbits (\$12.3 million). The FY 2020 budget request continues the important Commercial Weather Data Pilot program (\$3 million), as well as requesting funds to purchase data after successful testing (\$5 million). It is critical to begin now to design a more affordable and more effective data acquisition strategy and to minimize risk of potential observation shortfalls after the currently planned polar and geostationary satellite fleets. For the United States to remain a world leader, NOAA must be innovative, leverage new technology, and develop broader partnerships, while demonstrating organizational agility to adjust to changing needs, risks, and opportunities. To address this, NOAA's initial steps are focused on implementing NSOSA through greater use of new technologies, smaller satellites, and partnerships to meet its mission requirements.

CONCLUSION

NOAA's FY 2020 budget request reflects the commitment Secretary of Commerce Wilbur L. Ross Jr. and I have made to the President to advance national security and the economy. NOAA contributes to those priorities every day by putting data in the hands of those who need it to protect our communities and grow the economy.

America relies on NOAA to know when floods, wildfires, hurricanes, and severe weather threaten our communities. The growing maritime industry looks to NOAA data to safely and efficiently maximize the value of United States ports, fisheries, and coastal economies. All of these are enabled by NOAA's supercomputers, satellites, ships, aircraft, laboratories, facilities, and most importantly, our world-class workforce. In my short time at NOAA, it is clear to me that we have the most competent and committed people across the entire Federal Government. This FY 2020 budget request includes the core infrastructure and capabilities that these superior professionals at NOAA need to provide the critical services that the American people require.

NOAA's services touch every American, every day. I believe this budget request meets NOAA's core mission, while also positioning the agency to be more efficient and effective moving forward.

Thank you for the opportunity to present NOAA's FY 2020 budget request. I look forward to working with the members of this Committee and our partners and constituents to achieve our Weather & Water, Blue Economy, and Space Innovation goals. I am happy to respond to any questions.



National Oceanic and Atmospheric
Administration
U.S. Department of Commerce



Dr. Neil Jacobs

**Assistant Secretary of Commerce for Environmental
Observation and Prediction, performing the duties of Under
Secretary of Commerce for Oceans and Atmosphere**

Dr. Neil Jacobs is the Assistant Secretary of Commerce for Environmental Observation and Prediction, performing the duties of Under Secretary of Commerce for Oceans and Atmosphere. Dr. Jacobs is responsible for the strategic direction and oversight of over \$5.54 billion in annual spending, including key investments in developing a community model framework to advance U.S. weather modeling and prediction, space innovation, streamlining unmanned systems research to provide critical data across NOAA's mission areas, and unlocking the partnership potential of non-governmental and private organizations to study our nation's oceans and promote a blue economy.

Previously as the Chief Atmospheric Scientist at Panasonic Avionics Corporation, he directed the research and development of both the aviation weather observing platform and weather forecast model programs. He was previously the Chair of the American Meteorological Society's Forecast Improvement Group, and also served on the World Meteorological Organization's aircraft-based observing systems expert team.

Dr. Jacobs holds a bachelor degree in mathematics and physics from the University of South Carolina and masters and doctoral degrees in atmospheric science from North Carolina State University.

Chairwoman FLETCHER. Thank you, Dr. Jacobs.

At this point, we will begin our first round of questions, and I will recognize myself for 5 minutes.

I have two general categories of questions, so I'm going to try to move through them fairly quickly, Dr. Jacobs. The first is on the impact of the budget request to NOAA's mission and global leadership.

Despite NOAA's stated priorities of reducing the impacts of extreme weather and water events, maximizing the economic contributions of ocean and coastal resources, and advancing space innovation, the President's budget for Fiscal Year 2020 requests a total of \$4.5 billion for NOAA, which is 18 percent below the Fiscal Year 2019 enacted budget, as we heard previously.

A few questions if you could touch on these, how does NOAA intend to meet its mission and priorities with reduced funding for every single line office of the agency? How can the U.S. remain a global leader in weather forecasting, climate prediction, and oceanic and atmospheric research given these significant cuts across the board at NOAA? And how will NOAA continue to support robust private-sector and academic research in the ocean and atmospheric sciences with reduced funding for extramural grants throughout the agency?

Dr. JACOBS. Well, the FY2020 request, just going across the board, the climate is \$88 million, oceans are \$98 million, and weather is \$110 million. I would like to say that a lot of the research we're doing on the weather forecasting aspect, we're transitioning to a unified forecasting system, which is also—the weather model is going to double as a dynamic core for our climate model. So while we're funding the research for the weather model, that's actually going to benefit the dynamic climate modeling system.

On the weather forecasting side, currently the U.S. is not considered the leader. We're actually lagging the European Center, and that was the basis for the Earth Prediction Innovation Center, which actually sort of answers your last question. So the idea in this center would be to harness external development through universities and private industry and give developers for the model code a cloud-based sandbox so to speak to do collaborative model development, so it would harness a lot of what's in private industry as well.

And then on the ocean side, we have the National Oceanographic Partnership Program, which would also leverage private investment to help further some of our research.

Chairwoman FLETCHER. Thank you. And switching gears, the other topic that I want to cover with you with the remainder of my time is reductions in funding for Hurricane Forecast Improvement Project. This Fiscal Year 2020 budget request would slow the development of the Next-Generation Global Prediction System and Hurricane Forecast Improvement Project by reducing research grants for the collaborative research activities and NOAA's testbeds. The budget request notes that this \$2.1 million reduction may be offset by the additional funding for the Earth Prediction Innovation Center, but it is not clear whether that will be the case.

Hurricane Harvey inflicted \$125 billion of damage in Houston and southeast Texas, and hurricanes are predicted to increase in frequency and intensity with the changing climate. Timely and accurate hurricane forecasting will be essential to protecting life and property in the face of these oncoming disasters.

Dr. Jacobs, how can NOAA ensure that our communities are equipped with the best possible hurricane forecasts given this funding cut to the Hurricane Forecast Improvement Project and the rising threats from more intense and frequent storms?

Dr. JACOBS. So on the modeling side—so I'll break it in—I break it down into three sections to improve the hurricane forecasting. We have model code development, which we're doing through EPIC now. That includes the Finite Volume Cubed Sphere (FV3), which is our global model that we use for hurricane track. It also is ultimately going to be the model that we transition from the WRF (Weather and Research Forecast) Model, which is our hurricane intensity model, to the FV3.

I'd also like to mention the storm surge forecasting. This is something that's really critical. A lot of people don't realize when they think of hurricanes, they think about high winds, but it's actually the water that is responsible for the deaths of most individuals. We have a very sophisticated storm surge forecasting model that we're working on. That's actually funded through the National Weather Service. Even though it would be research, it's funded and it's used operationally in issuing watches and warnings.

The next step—you know, so going back to the observation side, we are acquiring more ship observations. We're outfitting an acquisition of a second backup capability with the G4 aircraft. We'll have both of our P3 Hurricane Hunters in operation this year.

The thing that I'd really like to highlight is the National Water Model. So one of the things that we haven't done yet but we're working on and we've—we saw this in Harvey and we'll see—we saw it in Florence and we'll likely see it again is the integration between the inland flooding and the storm surge. So one of the things a lot of individuals don't realize is, particularly in the case of Florence, when these storms produce a tremendous amount of rainfall, that rain has to exit the coast. And if there's onshore sustained winds from a storm surge, the water just piles up. So we're in the process of coupling our storm surge models with the National Water Model. That's something that we're going to be working on with the USGS (U.S. Geological Survey) and the stream gauge data that they provide. And while it won't be operational this year, I think that that's really going to show some improvements in the future.

Chairwoman FLETCHER. Thank you, Dr. Jacobs. And I see that my time has expired, so I'll now recognize Ranking Member Marshall for 5 minutes.

Mr. MARSHALL. Thank you, Chairwoman, again.

Dr. Jacobs, we have a saying back home in Kansas that if you don't like the weather, just wait an hour. And then my question is how does your new Earth Prediction Innovation Center, going to help my constituents, my farmers more particularly?

And just to give you one example, people think of agriculture and weather as all that matters is if it's raining or not, but take some-

thing as simple as alfalfa. You cut the alfalfa, there's probably about an hour or two each day that the humidity is maximum for locking in all the protein in those leaves. If you wait too long, it dries out. If you wait too long beyond that, it's going to—that afternoon thunderstorm is going to pop up. And if you do it too soon, there's too much moisture in it. So how are you—how is this EPIC going to impact my farmers?

Dr. JACOBS. So on—well, there's a couple different ways, so starting from the longer range and coming back into the shorter range, we are actually looking at seasonal to sub-seasonal forecasting with the dynamic climate models, as well as some statistical models. I think for long-range decisions in agriculture, that's going to be very helpful.

On the shorter range with the convective-allowing models, we're going to be looking at doing probabilistic forecasting. Right now, the capability to predict a tornado is not within the science, but we can predict the probability of a tornado. And so we have a couple of things we're working on here. One of them is what we call warn-on forecast where instead of actually waiting to see when the tornado appears on radar, we actually have the capability in the forecasting to simulate rotation in the thunderstorms and issue warnings before the tornadoes appear on the radar. That can extend the lead time slightly.

The other thing is social sciences. So one of the things that we learned in some of the social science research was that humans aren't necessarily rational, and we have to think really smart about how we message the warning. If—you know, if we give someone enough lead time to make a decision but on the other hand if we give them a lot of lead time, they might not make the same decisions. So the last step of this is actually interfacing with the emergency management community and also looking at the social science aspect of it.

Your statement about the moisture in the crops is interesting and also actually ties into the land surface modeling. So one of the things we've noticed with the land surface modeling is that the transpiration in plants over fields versus plowed fields can actually induce convective activity, so this is something that we're looking at, but it's at a very high resolution. And some of the satellite data we collect is critical to this.

Mr. MARSHALL. OK. Maybe we'll move on here. I'm sure we continue to have that discussion. There's more to talk about. But next, as I understand, NOAA is fast approaching the end of its current contract for its Weather and Climate Operational Supercomputing System, WCOSS—I'm sure you've got a pronunciation for that—a priority of this Administration, and we'll need to enter into a new contract. Can you explain the importance of this system for NOAA's mission, and are there any limitations in how NOAA must enter new contracts such as the ability to enter multi-year contracts to reduce costs?

Dr. JACOBS. So WCOSS is critical to our mission. This is our high-performance computing (HPC) where we run all of our operational models. The procurement process is a little bit tricky. Typically, we will go through a third-party vendor to do the procurement, but when they do the procurement, they actually acquire the

hardware from the actual vendors. And so what happens is when they—when this procurement agent goes to acquire the hardware from the vendors, they don't want to get stuck holding the bill, so they will actually ask us to put what's called a cancellation liability fee, essentially money in escrow to protect them in the very rare chance we might back out of the contract.

What happens is we have to essentially park \$50 million in escrow to protect them from us backing out. That \$50 million is \$50 million less of HPC that we actually can use for computing resources. And if we're on a 3-year rolling renewal of the lease cycle, we'll almost have to have this money parked indefinitely to protect us from that.

Mr. MARSHALL. OK. Thank you so much. I'll yield back the remainder of my time.

Chairwoman FLETCHER. Thank you very much.

I will now recognize Chairwoman Johnson for 5 minutes.

Chairwoman JOHNSON. Thank you very much.

Dr. Jacobs, you might know that I chaired a hearing on NASA's Fiscal Year 2020 Budget Request earlier this month, and one of the Members asked about FCC's (Federal Communications Commission's) 5G spectrum auction at the 24 gigahertz band. Administrator Bridenstine was very clear in saying that potential bleed over into weather data channels could take us back to the 1970s in terms of weather forecast. He mentioned a study that NASA did in conjunction with NOAA that determined that it's a very high probability that we are going to lose a lot of data.

Do you have any reaction to Mr. Bridenstine's response, and what is NOAA's current state of play on the issue, and what are we doing to mitigate any potential interference?

Dr. JACOBS. So the potential interference in the 24 gigahertz spectrum is essentially out-of-bounds emission from the adjacent spectrum. Now, we do passive water vapor sensing from our polar orbiting satellites, and if the out-of-bounds emissions thresholds are too large, essentially these instruments will just blind our satellites and we won't be able to detect water vapor.

We are currently—so our subject matter experts are looking at the proposed minus 20 decibel watts of out-of-bound emission proposed by the FCC. Our subject matter experts, along with NASA subject matter experts and subject matter experts from the FCC are collectively collaborating on a study. They're actively doing that right now. The results of that study will be decided upon on May 15, whereby we will ultimately make a decision on what the acceptable out-of-bounds emissions is to protect future spectrum. Right now, the number is in flux because there's a lot of assumptions that go into the study, but we should have a definitive answer in the next couple weeks.

Chairwoman JOHNSON. If this budget is enacted, would NOAA continue to participate in the NCA (National Climate Assessment) process in the absence of the dedicated funding?

Dr. JACOBS. Absolutely. So we—this won't limit our participation in NCA 5 at all. There's several other agencies. I would like to note that the NCA budget for NCA 1, 2, and 3 was originally produced without a budget line, so I don't see this impacting our ability to provide expertise and data for NCA 5 at all.

Chairwoman JOHNSON. OK. With the proposed budget, what do you predict would be the impacts that you would have to face?

Dr. JACOBS. Well, a lot of the cuts were made to external research grants in favor of maintaining core capabilities so that we wouldn't degrade our ability to deliver on our mission. So external research, as it pertains to universities and such, would likely take the largest hit. Maintaining our core capabilities is obviously a top priority, and the core capabilities within this budget will be maintained.

Chairwoman JOHNSON. Now, this budget proposes to aggressively cut grants as it relates to students and graduate students for—which really helps to create your manpower. How do you plan to address that?

Dr. JACOBS. Well, there's a lot of opportunities through external partnerships, through public-private partnerships, as well as the public-private partnerships collaborating with industry, and then using a lot of industry funding to drive academic research. So that's the crux of EPIC, the Earth Prediction Innovation Center, and also the backbone of NOPP, the National Oceanographic Partnership Program.

Chairwoman JOHNSON. You have knowledge of this industry spending coming about?

Dr. JACOBS. I do. So when I was at Panasonic, I actually did a lot of collaborative model development with the Weather Service. We also, through industry, funded five different universities, including PIs (principal investigators) and postdocs to do research. Granted, we had a financial interest as a private company, but the ultimate benefiter was the Weather Service in helping improve some of their forecast models, as well as different PIs at universities and their students who wanted to get research publications out.

Chairwoman JOHNSON. Thank you. My time is expired.

Chairwoman FLETCHER. Thank you, Chairwoman Johnson.

I'll now recognize Ranking Member Lucas for 5 minutes.

Mr. LUCAS. Thank you, Chairwoman.

Dr. Jacobs, the *Weather Research and Forecasting Innovation Act of 2017*, which I sponsored along with many of my colleagues here today, prioritized commercial weather data to improve our forecast skills. I understand NOAA is continuing the Commercial Weather Data Pilot program. Could you discuss with us for a bit what is the status of the program, and does NOAA plan to buy this data after it's tested?

Dr. JACOBS. Yes. So thank you very much for the *Weather Research and Forecasting Innovation Act*, as well as the *NIDIS Reauthorization*.

The Commercial—the Weather Data Pilot program, what we've learned through testing is that the GPS-RO (radio occultation) data that we were collecting adds value. We haven't quantified exactly how much, but we know that it adds enough value to make sense to enter into a contract to acquire the data, so we'll be transitioning that from a pilot program to an actual data acquisition program. The pilot program will still exist, and we're using that to explore space-based data sets beyond GPS-RO, for example, possibly hyperspectral sound or instruments like that.

Mr. LUCAS. Doctor, during my tour of the University of Oklahoma and Oklahoma State, I heard from several of my constituents that we are potentially on the cusp of a breakthrough in our ability to forecast short and long-term weather. And I know this is a topic that my colleagues have discussed also, but do you agree with this sentiment, and what steps can this Committee take to help assist NOAA and the private partners in this endeavor?

Dr. JACOBS. We are very close to making some major leaps forward. The primary difference between us and the European Center, which is the modeling agency that we're always compared to, is the data assimilation of the model. So while I just spoke earlier on the upgrade to the dynamic core, we haven't upgraded the data assimilation system yet. We're expecting that. It's probably 1-1/2 to 2 years away, but we have to upgrade a lot of the infrastructure and architecture around the software, including the dynamic core, before we upgrade the data assimilation system. That's where I think you're going to see the biggest leap forward and improvement in forecast skill, in addition to that, transitioning all of the code to cloud-based architecture.

One of the biggest hurdles in harnessing external collaborator development is they don't have login credentials to our machines because of various security requirements, so that—the best way to solve the problem was to move the model code to a compute architecture that they had access to external to NOAA. And I think once that transition is finished, you'll see development rapidly occur.

Mr. LUCAS. Thank you, Doctor. One last question, thinking about the Chairwoman's questions about the spectrum and frequency, this Committee has a long history of supporting investments in NOAA's satellite systems. If the FCC is going to auction off parts of the spectrum that affect the utility of the systems, is it worth continuing to fund these billion-dollar satellites, Doctor?

Dr. JACOBS. Well, we'll—ultimately, we'll have to wait until the final number is decided on the out-of-bounds emissions limits, and then we can actually use that number to determine how much of the data will be impacted. And once we determine how much data is impacted, then we can do an actual assessment on whether or not we can meet the mission requirements. If it's impacted such that we can't meet the mission requirements, then it would be prudent to rethink the investments in future polar orbiting satellites.

Mr. LUCAS. And that would be a shame if we lost all those billions of dollars in investment and that I would hope the other areas of the Federal Government are paying as close attention to this issue as you are, Doctor. Thank you very much.

I yield back the balance of my time, Chairwoman.

Chairwoman FLETCHER. Thank you very much, Mr. Lucas.

I will now recognize Mr. Tonko for 5 minutes.

Mr. TONKO. Thank you, Chairwoman Fletcher, and thank you, Dr. Jacobs, for joining us today.

As the global climate crisis continues to press devastation beyond our shores and into our communities, countless businesses, local news stations, and millions of Americans depend upon scientific forecasting from 4,200 National Weather Service employees to stay safe. With that in mind, I have some major concerns about National Weather Service understaffing.

In its Fiscal Year 2019 budget proposal, the agency sought to eliminate 355 positions in the NWS, including 248 frontline forecasters, 20 percent of all forecasters, in the NWS's 122 forecast offices nationwide. Congress soundly rejected these proposed reductions, and the House Appropriations Committees directed the National Weather Service to continue to hire in 2019 and to have additional FTEs (full-time employees) on board by the end of the fiscal year.

However, according to reports the agency has provided to the National Weather Service employees union, the number of FTEs at the NWS is essentially unchanged from the beginning of the fiscal year. There were, in fact, fewer nonsupervisory, nonmanagerial employees at the NWS at the close of pay period 5 in 2019—March 16, 2019, to be specific—than there were when the fiscal year began. NOAA has once again proposed to eliminate some 355 positions in the NWS in its Fiscal Year 2020 budget request.

So my question is, is the NWS intentionally failing to fill vacancies at the NWS in anticipation that Congress will eventually approve this request?

Dr. JACOBS. So the—during the shutdown—so typically this—this shutdown occurred during the end of the year, across the end of the year, so a lot of times when individuals retire, we will see that happen at the end of December. So prior to the shutdown and resuming after the shutdown, this was the first time since 2011 that the hiring has actually outpaced attrition. We haven't fully gotten back to the number that we recovered from what we saw during the shutdown, but during FY2019, the onboard rate right now is roughly 91.5 percent.

Mr. TONKO. Well, will you be committing to doing the remaining percent?

Dr. JACOBS. Yes, we are committed to trying to close that gap, but we're also battling attrition and retirement at the same time.

Mr. TONKO. Right, which is nothing new—

Dr. JACOBS. No, that's expected.

Mr. TONKO. OK. Last year, the agency informed the Appropriations Committee that there were 381 funded vacant positions at the NWS. What other items have to be done or what other forces have to be engaged to experience progress in filling these vacancies? I mean, you described some, but what else are you going to do for that percentage that are yet unfilled?

Dr. JACOBS. So if—when you see the cuts in there, that actually is largely offset by some money that we're going to save by reducing the need to move individuals around, so we just recently implemented what's called GS 5 through 12, which is a career progression, to go from the GS all—for GS 5 all the way to 12.

Typically, historically, a lot of times what would happen is a Weather Service forecaster, in order to receive a promotion, would have to move from one forecast office to another forecast office. And then many times we would actually have to pay the—pay for that move, in some cases buy their house. It ended up costing us around \$12–\$15 million a year. With the new GS 5 through 12 career progression, we actually will save money.

Mr. TONKO. Has this all been done in consultation with the employees?

Dr. JACOBS. Yes, this went through the employees union.

Mr. TONKO. And what effect has the recent shutdown—you mentioned that the shutdown was part of the delay, but what—can you describe with more detail what the recent shutdown had as an impact on hiring at the National Weather Service?

Dr. JACOBS. Well, the—you know, like I was speaking to earlier, typically, individuals will work through the end of the calendar year, so we see the most retirement right at the end of the year, and so that happened to coincide with the shutdown. So while they were retiring, there was, you know, simultaneously a delay in onboarding people. There was not just a delay in the direct hiring but a delay in the onboarding process. So the people who were actually already hired but not fully onboarded, that process was also delayed, and we're still digging out of that right now.

Mr. TONKO. So what happens if we have a future shutdown, and what impact can we anticipate or have we learned from that shutdown?

Dr. JACOBS. Well, it really depends on when it is during the calendar year. If it happens during the—in the end of the calendar year across a transition, then we'll likely see a fairly large number of retirements that we will, you know, be delayed in onboarding new individuals and, you know, once the lapse in appropriation is over.

Mr. TONKO. Madam Chair, I have exhausted my time, so I yield back.

Chairwoman FLETCHER. Thank you very much.

I'll now recognize Mr. Babin for 5 minutes.

Mr. BABIN. Thank you, Madam Chair, I appreciate it.

And, Dr. Jacobs, I appreciate you being here today as well.

Can you please talk a little bit about NOAA's relationship with NASA (National Aeronautics and Space Administration)? Are there opportunities to be more involved in utilizing one another's capabilities in the area of weather forecasting and predictions, and what could these relationships look like down the road?

Dr. JACOBS. So NASA, we have a fantastic relationship with NASA. The two agencies are very collaborative and work on a lot of different fronts. I think most people would think of the NOAA-NASA collaboration when it comes to our satellite programs, whether it's—

Mr. BABIN. Right.

Dr. JACOBS [continuing]. The geo hosted or the joint venture for polar orbiting. We've got some new things that we're working on on that front in addition to the commercial data buys.

But on the modeling side, there's a lot of collaborative work that we can do at NASA on this. We are trying to go to a unified forecasting system, so not just NOAA-NASA but all the different government agencies are working off the same model architecture so that whenever an agency is doing development work, whether it's NOAA and NASA, DOD (Department of Defense), DOE (Department of Energy), it all gets bundled into the same framework.

A lot of other interesting things we're working on with NASA are the data assimilation. We're looking at observation impacts through their forecast sensitivity to observation tool, which is extremely useful.

There's also work we're doing with them, as well as DOE, on looking at GPUs (graphics processing units) instead of CPUs (central processing units) for different type of processor work as well, in addition to that, exploring cloud compute architecture.

Mr. BABIN. OK. Thank you very much. Also, I represent southeast Texas where the Chairman had mentioned that we got hit so hard, decimated by Hurricane Harvey almost 2 years ago. We're still in the midst of recovery from this storm. And there's been a couple of severe storms already this year, and it's incredibly important to accurately predict storms and their magnitudes. How accurate is the state of our severe weather forecasting? And do you think that we can do it better?

Dr. JACOBS. I—we absolutely can do it better. There's always room for improvement. Right now, the model that we would typically use for the high-resolution convective forecasting only runs out a day. We rapid cycle that model so it refreshes every hour. There's a lot of work to be done on the physics in the model, as well as observing system capability. Once we eventually transition to a global model, a lot of our convective forecasts will be driven by data that we collect over the Pacific Ocean because the longer we predict out, the further west we have to do observations. So there's work to be done on the observing system side, as well as the modeling side, and parallel to that, utilizing HPC better because, as we go to higher resolutions, it requires more and more compute resources.

Mr. BABIN. OK. And then how do you plan to incorporate emerging commercial capabilities, especially in space weather area and in NOAA's long-range planning?

Dr. JACOBS. So when it comes to commercial space-based observing systems, essentially what we would do is look at the impact of the data and the models very much like we did with the GPS RO data and determine how much value it adds to the forecasting skill. That's a little bit of work on our part, too, because we have to make sure that the model is accepting of the data and can extract value out of it. Assuming that the commercial market to produce space-based weather observations is seeing value in selling the data to us, it's in my mind a more viable path to acquire the data. We can do it for less money. And, as long as they meet the thresholds that we set for quality and reliability, I think it's a definite path forward.

Mr. BABIN. OK. And then, lastly, what suggestions do you have for us Members of Congress, to help you maximize the best resources provided to NOAA?

Dr. JACOBS. Well, to maximize the best resources on the compute side, the cancellation liability fee is obviously a large concern because that's \$50 million extra HPC that we could be using that we're just sticking the money in an account. Transitioning to cloud-based architecture is, I believe, the future because it solves a bottleneck of compute resources on the research side. And there will be some upfront work to transition that code over. And then continuing to support scientists both on the modeling side and the software engineering side, both internal and external to NOAA, that's where I think we'll see the biggest improvements in forecasting.

Mr. BABIN. OK. Thank you very much, Doctor, and I yield back. My time is expired.

Chairwoman FLETCHER. Thank you.

I'll now recognize Dr. Baird for 5 minutes.

Mr. BAIRD. Thank you, Madam Chair.

And, Dr. Jacobs, we really appreciate you being here today.

My district is home to Purdue University, which administers the Illinois-Indiana Sea Grant college program, and that's in partnership with the University of Illinois. And this Sea Grant is funded through NOAA, and that works on aquatic invasive species and their control, pollution prevention, and economic opportunity. It also monitors weather and lake conditions using two buoys, which I understand they have their own Twitter account. Is that correct? But anyway, out in Lake Michigan where real-time data about windspeed, lake temperatures, and wave height is collected and sent to NOAA.

So my question, Dr. Jacobs, is, how does NOAA strike a budget balance between the internal research that stays with NOAA and the extramural research that goes out to NOAA's private and academic partners?

Dr. JACOBS. So in the tough budget situation we're in, we really had to prioritize maintaining our core capabilities of protecting life and property. And while the Sea Grant program is a fantastic program, I'm a huge supporter of it—we have Sea Grants Knauss fellows on our staff—it was one of the things that we ended up having to cut just to maintain our core capabilities.

Mr. BAIRD. Then my second question in that same area, historically, has more extramural research money been provided to universities by NOAA's research office or by their weather service?

Dr. JACOBS. Typically, the money for the research side, as well as the cooperative institutes, runs through the research side, not the forecast side, so the Weather Service budget was relatively flat. It was the research side.

Mr. BAIRD. Thank you. My next question then deals with the National Integrated Drought Information System, and I think that was reauthorized in December. So when Congressman Marshall made reference to the impact of EPIC on agriculture, because we have a lot of agriculture in my district—my question deals with how is this interagency partnership assisting farmers in the agricultural industry across the country?

Dr. JACOBS. So EPIC, while originally designed to support NOAA's mission, will actually be the transition for model development produced by NASA, DOD, DOE, and other agencies. So there—there's going to be a lot of development work running through EPIC by other agencies that will ultimately help the medium- to long-range forecasts.

So the dynamic model that we're looking at for global forecasting runs out 15 days. Then beyond that we have two methods for doing seasonal to sub-seasonal forecasting. One is a dynamic model and associated ensembles, as well as statistical models, which look at the dynamical model output and then derives statistical forecast running out 9 months. We're looking to extend those possibly beyond 18 months.

Mr. BAIRD. Thank you. Could you elaborate, though, how the National Integrated Drought Information System——

Dr. JACOBS. So the——

Mr. BAIRD [continuing]. Relates?

Dr. JACOBS. The *NIDIS Reauthorization* supports—in there was the authorization of EPIC but also supporting the seasonal to sub-seasonal forecasting as well, and that long-range forecasting is what the agricultural community is primarily interested in.

Mr. BAIRD. Thank you, Dr. Jacobs, and I'll yield back my time.

Chairwoman FLETCHER. Thank you, Dr. Baird.

Before we bring the hearing to a close, I want to thank Dr. Jacobs for testifying before the Committee today.

The record will remain open for 2 weeks for additional statements from the Members for any additional questions the Committee may ask our witness.

The witness is excused, and the hearing is now adjourned.

[Whereupon, at 11:00 a.m., the Subcommittee was adjourned.]

Appendix I

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by The Honorable Neil Jacobs

HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

"A Review of the NOAA Fiscal Year 2020 Budget Request,"

Questions for the Record to:

The Honorable Neil Jacobs

Assistant Secretary of Commerce for Environmental Observation and Prediction and
Acting Under Secretary of Commerce for Oceans and Atmosphere

Submitted by Chair of Subcommittee on Environment

Lizzie Fletcher

April 30, 2019

The Department of Commerce recognizes that the answers to these QFRs are extremely overdue and appreciates the ability to submit our responses for the record.

National Sea Grant Program

The National Sea Grant Program has an estimated return of \$8 for every \$1 of federal investment. In 2017, Sea Grant's work resulted in 12,500 jobs, \$579 million in economic benefit, and supported 2500 businesses. The FY20 NOAA budget proposes eliminating the National Sea Grant Program. This would eliminate funding for the network of 33 Sea Grant programs located in coastal States and territories and cause more than 3,000 scientists, researchers, students, and experts from over 300 institutions to lose Sea Grant funding. Sea Grant funded research has produced over 460 peer-reviewed publications. **Dr. Jacobs:**

- a. Why does your budget seem to completely eliminate programs and grants that have a good return on investment like Sea Grant, and support practical applications of NOAA science for local management and decision making?

Response:

The President's FY 2020 Budget prioritizes rebuilding the military and making critical investments in the nation's security. It also identifies the savings and efficiencies needed to keep the nation on a responsible fiscal path. To meet these goals, some difficult decisions needed to be made, including terminations and reductions to external grant programs. These reductions to extramural funding will allow NOAA to focus on its core, highest priority activities.

We note that state and local governments and industry may provide assistance to their local partners to continue this work.

- b. Why does this budget request not support economically valuable programs like Sea Grant?

Response:

The President's FY 2020 Budget prioritizes rebuilding the military and making critical investments in the nation's security. It also identifies the savings and efficiencies needed to keep the nation on a responsible fiscal path. To meet these goals, some difficult decisions needed to be made, including terminations and reductions to external grant programs. These reductions to extramural funding will allow NOAA to focus on its core, highest priority activities. We note that state and local governments and industry may provide assistance to their local partners to continue this work.

Climate Program Office

NOAA's Climate Program Office produces observations that are essential inputs into weather and climate models and supports the flow of information from scientists to decision-makers. This budget request proposes major reductions to NOAA's Climate Program Office, including eliminating funding for NOAA's Climate Competitive Research funding, which will end critical research supporting earth system science and modeling, climate and societal interactions, and education and community engagement. It also terminates the Regional Integrated Sciences and Assessments (RISA) program. RISA helps us answer how communities can increase their resilience to extreme weather and climate events. For over two decades, the RISA Network has "conducted decision-relevant research and sustained engagement to help Americans prepare for the economic implications of droughts, floods, forest fires, and other climate and extreme weather impacts." Just last year, NOAA was proposing "an expanded, more robust network to increase RISA capacity to conduct place-based risk management and foster disaster-resilient economic growth."

- a. Dr. Jacobs, what is the justification for eliminating the RISA program that last June¹ your agency was proposing to expand and grow?

¹ June 4, 2018. "Growing the RISA Network to Better Serve the Nation."
<https://noaa.maps.arcgis.com/apps/Cascade/index.html?appid=aa32015f29be44efaac6df8605bd3c81>

Response:

The President's FY 2020 Budget prioritizes rebuilding the military and making critical investments in the nation's security. It also identifies the savings and efficiencies needed to keep the nation on a responsible fiscal path. To meet these goals, some difficult decisions needed to be made, including terminations and reductions to external grant programs. These reductions to extramural funding will allow NOAA to focus on its core, highest priority activities. We note that state and local governments and industry may provide assistance to their local partners to continue this work.

- b. What is NOAA's overall commitment to funding climate science, decision support research, outreach, and capacity-building? Eliminating funding for Climate Program Office activities seems to imply that climate research is not important to NOAA.

Response:

NOAA will preserve priority activities including research at the Earth System Research Laboratory within OAR; the National Integrated Drought Information System (NIDIS); long-term observations and climate records; and research and development associated with Seasonal-to-Sub seasonal (S2S) prediction. NOAA will also carry out legislatively mandated work on the National Climate Assessment. This will allow NOAA to continue to enhance predictions of atmospheric patterns, increase understanding of ocean impacts on climate, improve climate modeling, and expand the nation's capacity to prepare for extreme events.

Congresswoman Suzanne Bonamici – April 30, 2019

Questions for the Record

Science, Space, and Technology Environment Subcommittee Hearing

A Review of the National Oceanic and Atmospheric Administration's FY20 Budget Request

Thank you Chair Fletcher and Ranking Member Marshall, and thank you Dr. Jacobs for being here today.

I am deeply disappointed in the drastic cuts to NOAA's Climate Program Office. The Fourth National Climate Assessment makes it clear that greenhouse gas emissions from human activities are the most substantial factor that account for global warming over the past six decades, and carbon dioxide concentrations in the atmosphere are now

higher than at any time in the last three million years. As one of the thirteen federal agencies contributing to the Fourth National Climate Assessment, NOAA should be responsive to these findings. I hope that NOAA will recognize the climate crisis soon because we cannot delay action any longer.

Question 1: In 2017, Congress passed my Tsunami Warning, Education, and Research Act to help coastal communities prepare for tsunami and update our nation's tsunami warning systems.

In NW Oregon, we know that it is not a question of if, but when, a Cascadia Subduction Zone event will trigger a tsunami and wreak havoc on our coast. I am extremely concerned the Fiscal Year 2020 budget request proposes eliminating the Tsunami Research and Operation Warning Program and consolidating the Pacific Tsunami Warning Center in Hawaii and the National Tsunami Warning Center in Alaska.

How will NOAA provide the same timely and accurate messaging in the event of a tsunami with these cuts? What scientific evidence did you factor into the reduction of tsunami preparedness efforts in your budget request?

Response:

Under the FY2020 budget, NOAA will continue to fund core tsunami program components in order to provide tsunami watches, warnings, and advisories throughout the Pacific. Furthermore, with the FY 2020 request, NOAA will maintain its full array of 39 Deep-ocean Assessment and Reporting of Tsunamis (DART®) moorings at a data availability rate of 80 percent to support the tsunami mission. This core observing and warning capability is not reduced in this budget proposal.

The proposed budget would require NOAA to evaluate the current warning center structure to streamline NOAA's tsunami research and operational warning program. NOAA will continue to explore options as stated in the 2010 National Academies of Sciences report, *Tsunami Warning and Preparedness: An Assessment of the U.S. Tsunami Program and the Nation's Preparedness Efforts*. The report discussed options to either merge the two Tsunami Warning Centers or co-locate them with (1) academic or scientific institutions or (2) warning or mission-critical centers such as the National Centers for Environmental Prediction. We look forward to working with the committee on a comprehensive approach to seismic hazards.

Question 2: Harmful algal blooms, or HABs, affect marine, coastal, estuarine, and freshwater systems in all 50 states and all U.S. territories. HABs and hypoxic events threaten the health of our oceans, lakes, and rivers and cause significant environmental, economic, and public health consequences.

For example, in the Pacific Northwest we have seen HABs, and the biotoxins they produce, accumulate in shellfish and devastate our Dungeness crab industry. NOAA recently released a new interactive story map demonstrating that we have an insufficient understanding of socioeconomic effects of HABs and hypoxia. Yet the Fiscal Year 2020 budget request proposes a more than \$24 million cut to the Coastal Science, Assessment, Response, and Restoration account and a complete elimination of the Coastal Science and Assessment Competitive Research program.

What is the justification for cutting research on harmful algal blooms and hypoxia when events are expected to increase with warming waters and a changing climate?

Response:

The President's FY 2020 Budget prioritizes rebuilding the military and making critical investments in the nation's security. It also identifies the savings and efficiencies needed to keep the nation on a responsible fiscal path. To meet these goals, some difficult decisions needed to be made, including termination and re-scaling of programs.

Please note that some activities within the Coastal Science, Assessment, Response and Restoration and Competitive Research budget lines are being reduced or consolidated because of other Federal, state, and local efforts in coastal science, as well as the Budget's focus on reducing extramural funding and prioritizing core, mission driven programs.

That said, NOAA will continue to address harmful algal blooms (HABs) and hypoxia. NOAA will spend approximately \$8 million on harmful algal bloom (HAB) related activities in FY 2020. This includes \$4.6 million in funding to support portions of the HAB and hypoxia research, prevention, and forecasting program within the Coastal Science, Assessment, Response and Restoration budget line. NOAA also carries out some HABs activities in other programs (e.g., IOOS). To help communities anticipate HAB impacts, under the FY2020 President's Budget, NOAA will continue to provide HAB forecasting services in the Pacific Northwest, which are vital to commercial and recreational shellfish industries, the Gulf of Maine seasonal forecast, Southern California HAB bulletin, Great Lakes Seasonal HAB forecast and bulletin, and Florida/Gulf Coast HAB respiratory impact forecast. Other Federal agencies also have HAB research programs.

Question 3: About one third of the carbon dioxide in the atmosphere dissolves into the ocean, causing water chemistry to change. As oceans and estuaries absorb carbon dioxide produced by human activity, the waters become more acidic, destabilizing fisheries and threatening the future of coastal communities and ecosystems. NOAA's Ocean Acidification Program works to expand scientific research and monitoring of ocean acidification, but the program is still quite limited in scope.

A 2009 white paper from the Ocean Carbon and Biogeochemistry's Ocean Acidification Subcommittee estimated that that a U.S. national program on ocean acidification would need \$50 to \$100 million per year to provide timely information for managers and decision-makers. The Administration's budget request only provides a little over \$12 million for the Integrated Ocean Acidification Program.

What research gaps still exist in responding to and mitigation of ocean acidification?
How will the agency address these gaps with the proposed lack of increase in funding for the NOAA OAP?

Response:

The President's FY 2020 Budget prioritizes rebuilding the military and making critical investments in the nation's security. The Ocean Acidification Program will continue all current work and activities within the President's requested budget. NOAA understands the need for a better understanding of ocean acidification impacts and will continue to execute this research internally and with external expertise and academic stakeholders.

In accordance with the requirements under the FOARAM Act, NOAA will continue advancing ocean acidification science and assessing potential risk to the Nation's Blue Economy under increasing acidification. As new knowledge is gained, new fronts emerge which demand a continued focus by NOAA and partnering agencies to ensure the nation's marine dependent industries and resource managers are suitably hardened against increasing OA impacts. To address these demands, NOAA is currently drafting an agency-wide NOAA OCEAN AND GREAT LAKES ACIDIFICATION, RESEARCH PLAN 2020-2029 which is expected to be completed in the spring of 2020. The plan details the science priorities that the agency will work to tackle over the next decade.

Question 4: NOAA was directed in the Weather Research and Forecasting Innovation Act to produce a report regarding gaps in the coverage of the National Weather Service's Next Generation Weather Radar with 180 days of enactment. We have still not received a copy of that report. When will we receive it?

Response:

The National Oceanic and Atmospheric Administration is working diligently to complete the report as directed by the Weather Research and Forecasting Innovation Act. As part of this national study, we are analyzing tens of thousands of tornado and flash flood events from 2006 to 2016 and the resulting damage, injuries, and deaths, and correlating these data with radar coverage, as directed in the legislation. This is a very large task. We are completing the internal coordination, review, and clearance process of this report and will have it available as soon as possible. We will keep Congress apprised of the progress on this eagerly-anticipated report.

Question 5: A few years ago, a fisheries biologist contacted me after she and some of her female colleagues experienced sexual harassment while conducting research on a NOAA ship. There seemed to be insufficient investigation into her case and other women's reports of pervasive sexual harassment. I contacted then NOAA Administrator Dr. Sullivan and I was pleased to see the agency begin to change policies and procedures to make it easier to deter and report sexual harassment. The agency implemented new training and changed their investigation protocol.

The NOAA Blue Book for FY 2020 states that NOAA will "ensure sufficient resources are allocated to the Workplace Violence Prevention and Response Program." What specific steps will you take to prevent and address sexual harassment at NOAA, especially on NOAA vessels?

Response:

Like many agencies and society as a whole, NOAA also has sexual harassment and hostile work environment issues. NOAA leadership takes these issues extremely seriously. Preventing and responding to sexual assault and sexual harassment is a top priority for NOAA. Thus, NOAA has elevated the Workplace Violence Program to be under the Deputy Under Secretary for Operations, Ben Friedman.

NOAA will continue to focus on ensuring leaders understand the importance of committing proper time and funding to preventing and eliminating sexual assault and sexual harassment across the bureau. NOAA's highest priorities are completing the NOAA-wide workplace assessment and implementing bystander intervention training. A company has been hired to

perform this assessment and develop bystander training. Work on the assessment phase started in May 2019 and the completed product is due in April 2020. NOAA will bring awareness and resources to leaders and employees by hosting a Sexual Assault and Sexual Harassment (SASH) Summit in September 2020 featuring experts in prevention and response to sexual assault and sexual harassment. NOAA has also created a SASH Council consisting of representatives from line, staff, and program offices and stakeholders to implement the SASH strategic plan. This council first convened in September 2019 and meets monthly.

NOAA completed the following actions:

- NOAA partnered with the nation's largest anti-sexual violence organization, Rape, Abuse, & Incest National Network (RAINN), and, in December 2016, established a Sexual Assault and Sexual Harassment Helpline (SASH Helpline), which continues to provide crisis intervention, referrals, and emotional support to victims. These services are available to NOAA employees, including NOAA's commissioned officer corps, and individuals who work with or conduct business on behalf of NOAA.
- The NOAA Sexual Assault and Sexual Harassment Prevention and Response Policy was issued on February 26, 2018.
- NOAA transmitted the first Report to Congress on Sexual Assaults in NOAA last year and is in the final stages of reviewing the report for 2018.
- In August 2018, NOAA hired a Workplace Violence Prevention and Response Program Manager to develop an agency-wide program to prevent and respond to sexual assault and sexual harassment.

In addition, the NOAA Corps and the Office of Marine and Aviation Operations leadership have taken the following additional steps:

- OMAO partnered with the U.S. Coast Guard to train three victim advocates and one OMAO victim advocate liaison, who is located at MOC-P in Newport, Oregon.
- Designed OMAO specific training for our personnel using a case study based approach. Real ship, aircraft and remote operational scenarios are used throughout the course. The scenarios discussed are realistic and applicable to our unique workforce and work environments. This training is conducted in-person with a highly experienced facilitator and is group training completed as a team in the field or in the office. *Please note: specific care was taken to ensure the case studies are anonymous and mixed enough to not be able to identify victims.*

- Commissioned a maritime training company to develop a new welcome aboard video specific to the topic of civility. The video includes recognizing and reacting to harassment of all types and was made in partnership with UNOLS. This video has been developed and made available to all field units.
- OMAO continues to have a dedicated investigative services contract in place to investigate expediently and thoroughly. The investigator is linked with employee labor relations specialists to ensure appropriate actions are taken in a timely manner when necessary.
- Ten OMAO personnel attended an Investigation Training Course to bolster the investigative skill set within OMAO to ensure trained personnel are available to assist and conduct proper investigations.
- In 2018 OMAO extended their annual safety survey from the aviation community to the maritime community. This survey, based on decades of Navy surveys and analysis, has helped to shape the leadership priorities and initiatives for OMAO's Aircraft Operations Center for multiple years and proven successful. A separate safety survey was facilitated within OMAO's marine community for the first time and has already shown similar success. The survey covers a variety of topics and provides leadership at the ship command, center command, marine operations and Director level a pulse on the climate and culture.
- Hired a Nurse Practitioner Board Certified in Women's Health.
- OMAO is actively pursuing an affiliate partnership with the National Institute for Occupational Safety and Health (NIOSH) for OMAO's Total Worker Health Program. The/ partnership represents OMAO's commitment to prioritizing an integrated approach to policies, programs, and practices that protect, promote, and advance employee safety, health, and well-being. By focusing on both organizational and environmental factors that influence our employees' health and productivity, we are better able to understand and implement controls and strategies that more broadly advance worker well-being.
 - Areas of initial interventional focus and action include:
 - Drug and ETOH Testing & Substance Abuse Education
 - Mental Health Screening and Support
 - Respectful Workplace Training and Victim Advocacy
 - Maintenance of Operational Platforms

- Job Training
- OMAO EEO position integrated in TWH Initiatives
- Fatigue at Sea/ Crew rest analysis and strategic changes/ education
- Family Life and Deployment Readiness
- Healthy Diet and fitness in Operational Environments

