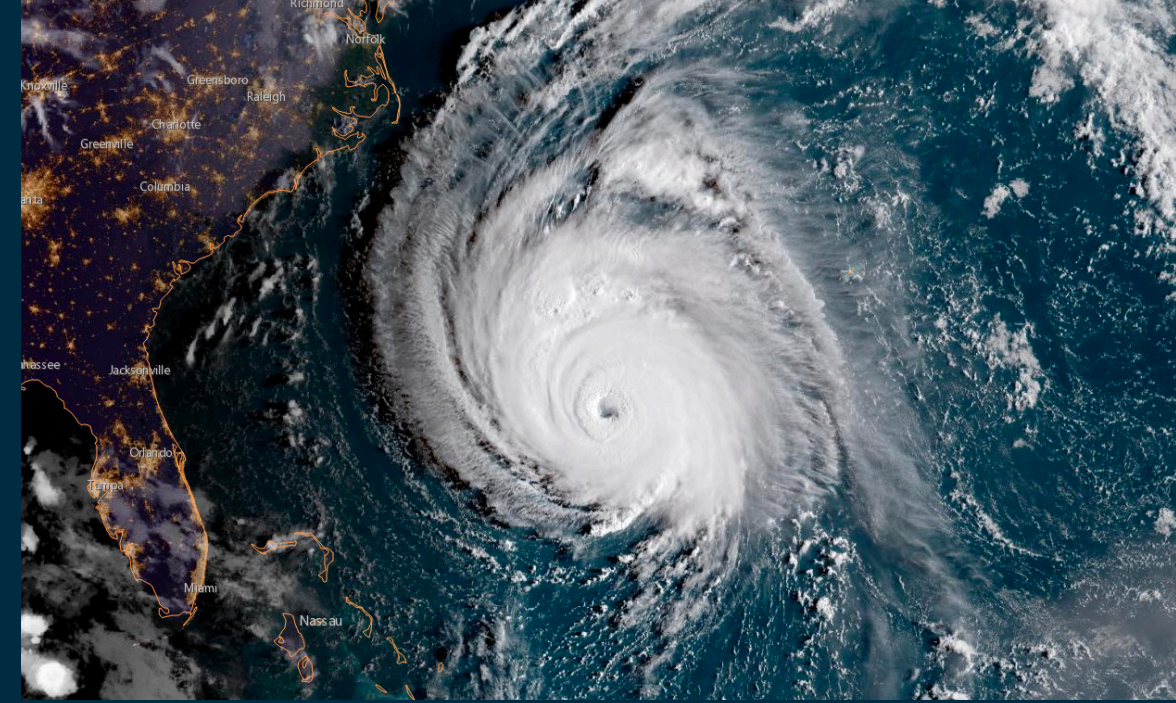


Cover Images: These images reflect NOAA's work to reduce the impact of extreme weather and water events, expand the blue economy, and innovate in space. Photos top to bottom reflect: **1)** GOES East imagery of Hurricane Florence over the Atlantic on Sept. 12, 2018; Florence was still a Category 4 hurricane with max sustained winds of 130 mph. GOES East provides forecasters with sharper, more defined images of severe storms, hurricanes, wildfires and other weather hazards in near real-time 24/7. **2)** A container ship enters the shipping channel at Port Miami, where vessel pilots now have access to real-time current information via PORTS® to help mariners navigate safely and efficiently in support of maritime commerce. **3)** School of yellowfin tuna. NOAA works with the fishing community in the Gulf of Mexico to harvest highly migratory species such as yellowfin tuna and swordfish using alternative fishing gear that results in low bycatch.



BUDGET SUMMARY

NOAA 2020



United States Department of Commerce
National Oceanic and Atmospheric Administration
14th and Constitution Avenue, NW
Washington, DC 20230
www.noaa.gov

National Ocean Service
www.oceanservice.noaa.gov

National Marine Fisheries Service
www.fisheries.noaa.gov

Office of Oceanic and Atmospheric Research
www.research.noaa.gov

National Weather Service
www.weather.gov

National Satellite and Information Service
www.nesdis.noaa.gov

Office of Marine and Aviation Operations
www.oma.noaa.gov

© ISSJ (2012)

Photo: Jeff Muir

Contents

CHAPTER 1

Introduction 6

CHAPTER 2

**Priority—Reduce the Impacts of Extreme Weather
and Water Events** 12

CHAPTER 3

**Priority—Maximizing the Economic Contributions of
Ocean and Coastal Resources** 18

CHAPTER 4

Priority—Space Innovation 28

CHAPTER 5

National Ocean Service 34

CHAPTER 6

National Marine Fisheries Service 40

CHAPTER 7

Office of Oceanic and Atmospheric Research 48

CHAPTER 8

National Weather Service 51

CHAPTER 9

**National Environmental Satellite, Data, and
Information Service** 62

CHAPTER 10

Mission Support 70

CHAPTER 11

Office of Marine and Aviation Operations 76

CHAPTER 12

Summary of Program Change Reductions 81

APPENDIX 1

Proposed Changes to General Provisions 91

APPENDIX 2

Technical Adjustments 92

APPENDIX 3

Control Table 93



Sea, swell, sky, and a monk seal swimming over a coral reef bottom in Hawaii, Northwest Hawaiian Islands.

Terminology

The reader should be aware of the specific meaning of several terms as they are used throughout this budget summary:

FY 2018 Spend Plan

Fiscal Year (FY) 2018 Consolidated Appropriations Act, 2018 (P.L. 115-141).

FY 2019 Enacted

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

Adjustments-to-Base

Includes certain inflationary adjustments such as the estimated 2020 military pay raise of 2.1 percent as well as inflationary increases for labor and non-labor activities including benefits and rent charges from the General Services Administration (GSA). In addition, ATBs include unique/technical adjustments to the base program, for example transfers of base resources between budget lines.

FY 2020 Base

FY 2019 Enacted plus Adjustments-To-Base.

Program Change

Requested increase or decrease over the FY 2020 base.

FY 2020 Request

FY 2020 base plus Program Changes.



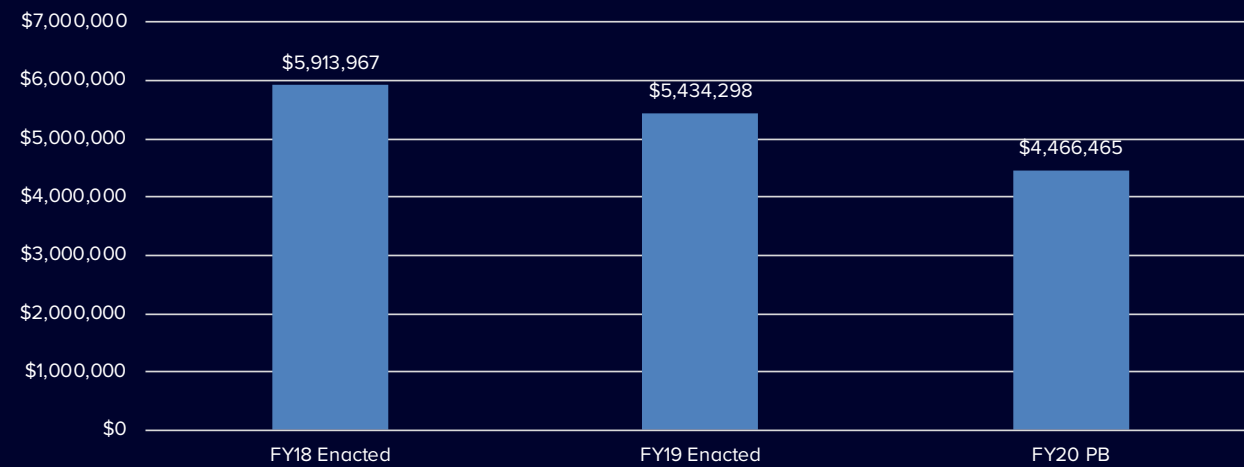
NOAA P-3 seen head on.

Introduction

NOAA's FY 2020 request includes \$4,466,465,000 in discretionary appropriations, a \$967,833,000 reduction from the FY 2019 Enacted level. This request supports NOAA's mission: 1) to understand and predict changes in climate, weather, oceans, and coasts; 2) to share that knowledge and information with others; and 3) to conserve and manage coastal and marine ecosystems and resources. This budget advances NOAA's goals of reducing the impacts of extreme weather and water events to save lives and protect property by implementing Public Law 115-25, Weather Research and Forecasting Innovation Act of 2017 and Public Law 115-423, National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018, and maximizing the economic contributions of our ocean and coastal resources, by expanding the blue economy and reducing the seafood trade deficit. Further, the FY 2020 budget advances space innovation as well as observations from unmanned systems and commercial providers through new approaches to NOAA satellite missions and provides for mission support activities essential to accomplishing all NOAA missions. More information about NOAA's specific FY 2020 initiatives is provided in the chapters and appendices that follow as well as in NOAA's FY 2020 Congressional Justification (<http://www.corporateservices.noaa.gov/nbo/>).

NOAA Discretionary Budget Trends

DOLLARS IN THOUSANDS



NOAA appreciates the continued support of Congress, the Administration, and our broad and diverse base of stakeholders. We will continue to monitor major milestones and accomplishments of our programs and activities to evaluate progress and demonstrate success. NOAA's top accomplishments from 2018 are referenced in the chapters that follow. Below are highlights of NOAA's accomplishments before, during, and after the 2018 Atlantic hurricane season which had 15 named storms, including eight hurricanes of which two were categorized as major with winds of 111 mph or greater," Florence and Michael. NOAA infrastructure, preparation, improved storm surge products, and enhanced computer modeling resulted in extremely accurate forecasts of two of the most destructive storms in U.S. history. The forecasts, coupled with proactive decision support services allowed emergency managers and the public to take life-saving measures.

DISASTER PREPARATION

NOAA's Disaster Preparedness Program (DPP) is designed to provide disaster response and recovery training, exercises, lessons learned, and resources within NOAA and to our emergency response partners across the nation. The DPP is essential to deliver tide

and current information, oil and chemical spill response, environmental and infrastructure damage assessment, habitat conservation and restoration planning, marine debris identification and removal, and navigation management. The DPP trained 1,192 people in 2018 and during the 2018 Hurricane season the program facilitated daily coordination calls with several other NOAA entities along the coast to prepare for potential impacts to NOAA staff, assets, and facilities to ensure the best possible position to respond to threats quickly, safely, and effectively. In addition, in preparation for the 2018 hurricane season, coastal managers used the Storm Surge Modeling Tool developed by the National Centers for Coastal Ocean Science to support their planning and communication. The new model considers how sea-level rise will change shorelines to better predict storm surge. For example, the Apalachee Regional Planning Council in Florida used the model's more accurate storm surge data to update strategic planning documents.

In order to ensure protection of life and property for Puerto Rico throughout the 2018 Hurricane Season, NWS conducted

an emergency restoration of the San Juan NEXRAD system's Pedestal, Antenna, Radome, and Tower which were damaged in Hurricane Maria. The restoration was conducted during a period when Puerto Rico was still under FEMA assistance to restore the island's utility and road infrastructure. Despite these limitations, the Radar Operations Center (ROC) maintenance team was able to complete the project by June 2018, the official start of the Atlantic hurricane season.

HURRICANE FLORENCE

On September 14, 2018 Hurricane Florence officially made landfall in North Carolina as a Category 1 storm with maximum sustained winds of 90 mph. While Hurricane Florence weakened as it moved across the Carolinas, its large size and slow progress resulted in a deluge of rain and subsequent flooding.

Before Hurricane Florence made landfall, the National Hurricane Center (NHC) issued the Potential Storm Surge Flooding Map which was used widely by emergency managers and the media to prepare for worst case storm surge scenarios for predicted coastal and inland river flooding. The National Water Center (NWC) provided "River Flooding Overview" maps to emergency managers in North and South Carolina. Throughout the storm, the Center for Operational Oceanographic Products and Services (CO-OPS) issued Storm QuickLook postings every



Wooden steps are all that's left of a pier in Newport, NC after Hurricane Florence made landfall in September 2018.

six hours. Ultimately, NOAA water level stations detected record-breaking flooding throughout North Carolina. The Potential Storm Surge Flooding Map proved similar to the hindcast for locations where storm surge flooding was forecast to be most severe, this similarity demonstrated that these are a reliable and important tool in storm surge forecasting and warning.

NOAA's suite of operational and experimental models stood ready for the 2018 hurricane season. The models correctly predicted Hurricane Florence's decreased storm intensity as it approached the North Carolina coastline. Prior to the start of the hurricane season, NOAA upgraded its Hurricane Weather Research and Forecast system (HWRf) and Hurricanes in a Multiscale Ocean-coupled Non-hydrostatic (HMON) models. These upgrades allowed forecasters to view higher-resolution models coupled with additional datasets, which led to more accurate predictions. Compared to previous predictive models, the HWRf and HMON improved track and intensity forecasts by approximately five percent.

HURRICANE MICHAEL

NOAA collected an unprecedented number of observations taken before, during and after Hurricane Michael. NOAA's aircraft, the WP-3 Hurricane Hunter and the G-IV, flew missions that collected critical observations conveying Michael's rapid intensification over a three-day period. For additional data, NOAA also successfully piloted a small unmanned aircraft, the Coyote, into 183 mph winds of the eyewall. NOAA, the U.S. Navy, and academic partners deployed up to 25 gliders in the Caribbean Sea, Tropical Atlantic, and Gulf of Mexico that continuously transmitted sea surface temperature and salinity data throughout the event. With these in situ observations, satellite products produced by NOAA revealed the main ocean features (Loop Current, Warm Rings, Barrier Layers and warm coastal waters) that contributed to Michael's

intensification. The U.S. Integrated Ocean Observing System (IOOS®) worked closely with its Gulf of Mexico and southeastern U.S. regional associations to monitor Hurricane Michael's aftermath and assist in response.

Hurricane Michael made landfall on October 10th. NOAA's operational HWRF was the first model to predict Hurricane Michael making landfall four days in advance as the first Category 4 storm on record to hit the Florida Panhandle and the third strongest hurricane to ever strike the US. The HWRF also predicted the rapid intensification of Hurricane Michael at least 60 hours in advance. The NHC accurately forecasted landfall within 60 miles of the original advisory, adding confidence to help partners make decisions.

Upon landfall, catastrophic storm surge of up to 15 feet affected the Gulf coast and devastating winds in excess of 100 mph spread well inland across Georgia. NWS issued new warning products, Extreme Wind and Storm Surge Warnings and used social media, including Facebook Live events from the Director of the NHC to engage the public so they understood the historic nature of the storm. This effective and consistent messaging of the magnitude of Michael's impacts was made available more than four days before landfall and throughout the storm. This allowed people to take life-protecting measures and directly mitigated the loss of life in a historically strong landfall.



Imagery collected by NOS's National Geodetic Survey captures a call for "Help" following Hurricane Michael.

DISASTER RESPONSE AND RECOVERY

NOAA's aircraft, King Air and the Turbo Prop Air Commander collected data used by FEMA, state, and local emergency managers to prioritize limited resources. Following Florence, NOAA aircraft collected images covering more than 8,575 sq km and after Michael, NOAA King Air collected images covering more than 4,153 sq miles. The imagery assessed impacts to navigation, identified landing zones for helicopters to deliver supplies to areas cut off by the storm, and helped locate displaced vessels and potential hazardous substance releases. These images are available to the public and were used extensively by home and business owners to survey their property remotely, rather than reenter areas with limited supplies or on-going dangerous situations. Geostationary Operational Environmental Satellite-East (GOES-East, formerly known as GOES-16) provides real-time imagery every 30 seconds, which is critical during severe weather events. For example, GOES-East observed Hurricanes Florence and Michael, and delivered infrared and visible imagery, as well as enhanced information, used by workforce organizations, local news, and state and local emergency managers to inform the public prior to, during, and after storms for preparation and recovery efforts. In the aftermath of Michael, one Florida woman was able to send rescuers to her family's aid after spotting the word "HELP" written on their lawn in these images.

NOAA's Office of Response and Restoration (OR&R) also used this imagery to identify potential pollution sources such as displaced, overturned, and capsized vessels and containers due to Michael's extreme winds and storm surge. The imagery was ingested into OR&R's Environmental Response Management Application (ERMA®) which also allowed NOAA and the U.S. Environmental Protection Agency to identify regulated facilities, commercial and industrial, and Superfund sites in the affected zones. Identification of these targets allowed the U.S. Coast Guard (USCG) to move forward



Following Hurricane Maria and a devastating winter storm, NOAA and partners restored all trails at Jobos Bay National Estuarine Research Reserve. Hikers once again can view the unspoiled mangroves and lagoons that shelter the endangered yellow-shouldered blackbird, hawksbill sea turtle, and West Indian manatee. Reserve trails are essential to the tourism and recreation sector, which accounts for 87 percent of Puerto Rico's ocean economy. Photo Credit: Milton Muñoz

with tagging vessels for removal in addition to other activities. NOAA worked with state and territory agencies in the impacted regions to determine the amount and types of debris left in the environment after FEMA and other agencies completed their emergency response removals.

NOAA coordinated with the U.S. Army Corps of Engineers (USACE), the USCG and other partners to survey waterways and identify potential dangers to navigation. On the Cape Fear River, NOAA's Navigation Response Teams and NOAA Ship *Ferdinand R. Hassler* surveyed the area around the clock to provide condition surveys. Local USACE personnel relied on this information to reopen the ports of Wilmington and Morehead City, North Carolina. NOAA updated its charts with the new hazards and distributed them to the port, USCG, and key stakeholders in less than 24 hours. In addition, from August to November 2018, the *Thomas Jefferson* continued to conduct follow-up surveys in Puerto Rico and the US Virgin Islands region. The data collected is being used to verify clearance of dangerous obstructions identified during 2017 response operations and provide high-resolution, full bottom coverage and shoreline

detail for nautical chart updates and habitat mapping. The *Thomas Jefferson* efforts directly supported Puerto Rico's ocean dependent economic sector.

On October 1, NOAA Office of Law Enforcement (OLE) was rapidly deployed by FEMA to South Carolina to assist with the aftermath of Hurricane Florence. As part of its FEMA tasking, NOAA's OLE trucks allowed teams to access areas previously unreachable due to downed trees and high water. Some delivered water to neighborhoods, while others helped identify stranded community members and move vessels to waterlogged locations. On October 9, FEMA again called upon OLE for assistance in the aftermath of Hurricane Michael. OLE sent a team of 13 officers and agents, three of whom had served on the Florence team.

NOAA quickly worked to declare the fisheries disasters for both Florence and Michael which provides the basis for Congress to appropriate assistance funds and can enable eligible entities to access other loan or funding programs. Ultimately NOAA's quick assessment of the aftermath of both Florence and Michael resulted in more efficient response and relief



Waterspouts off the port of Grand Isle, Louisiana.

Priority— Reduce the Impacts of Extreme Weather and Water Events

Each year, the United States averages 10,000 thunderstorms, 5,000 floods, 1,300 tornadoes and two Atlantic hurricanes, as well as widespread droughts and wildfires. Weather, water and climate events cause an average of 650 deaths and \$15 billion in damage per year and are responsible for 90 percent of all presidentially-declared disasters. About one-third of the U.S. economy—\$3 trillion—is sensitive to weather and climate¹.

NOAA provides weather, water, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NOAA operates on the front lines of weather and water disaster prediction, response, and recovery by providing local communities and emergency responders the real-time intelligence they need to assess damage and accelerate recovery. In other words, NOAA puts weather and other environmental information into the hands of people

¹ <https://www.noaa.gov/weather>

and industries to protect lives and property, support the U.S. economy, and manage sustainable coastal ecosystems.

Accelerating the advancements in the U.S. global modeling program is a top priority of the administration and at 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 problems exist with 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 uncoordinated, and the funding process disincentivizes collaboration.

The FY 2020 request addresses many of these challenges through the creation of the Earth Prediction Innovation Center (EPIC). Authorized in the National Integrated Drought Information System Reauthorization Act of 2018, 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 leverage expertise on a national scale to enhance weather forecasting.

Aligned with these investments, NOAA will establish bold new performance targets: extending useful forecast lead time beyond the current skill of 9.5 days to 10 days in 2020, producing the best global weather models by 2022, and transitioning 15 new forecast improvements to operations in support of the Weather Act and the U.S. weather enterprise. The FY 2020 request will continue NOAA’s capacity to provide relevant information can help create a society that is more adaptive to its environment; experiences fewer disruptions, dislocation, and injuries; and that operates a more efficient economy.

BELOW ARE SOME OF NOAA’S TOP 2018 ACCOMPLISHMENTS THAT SUPPORT THIS PRIORITY:

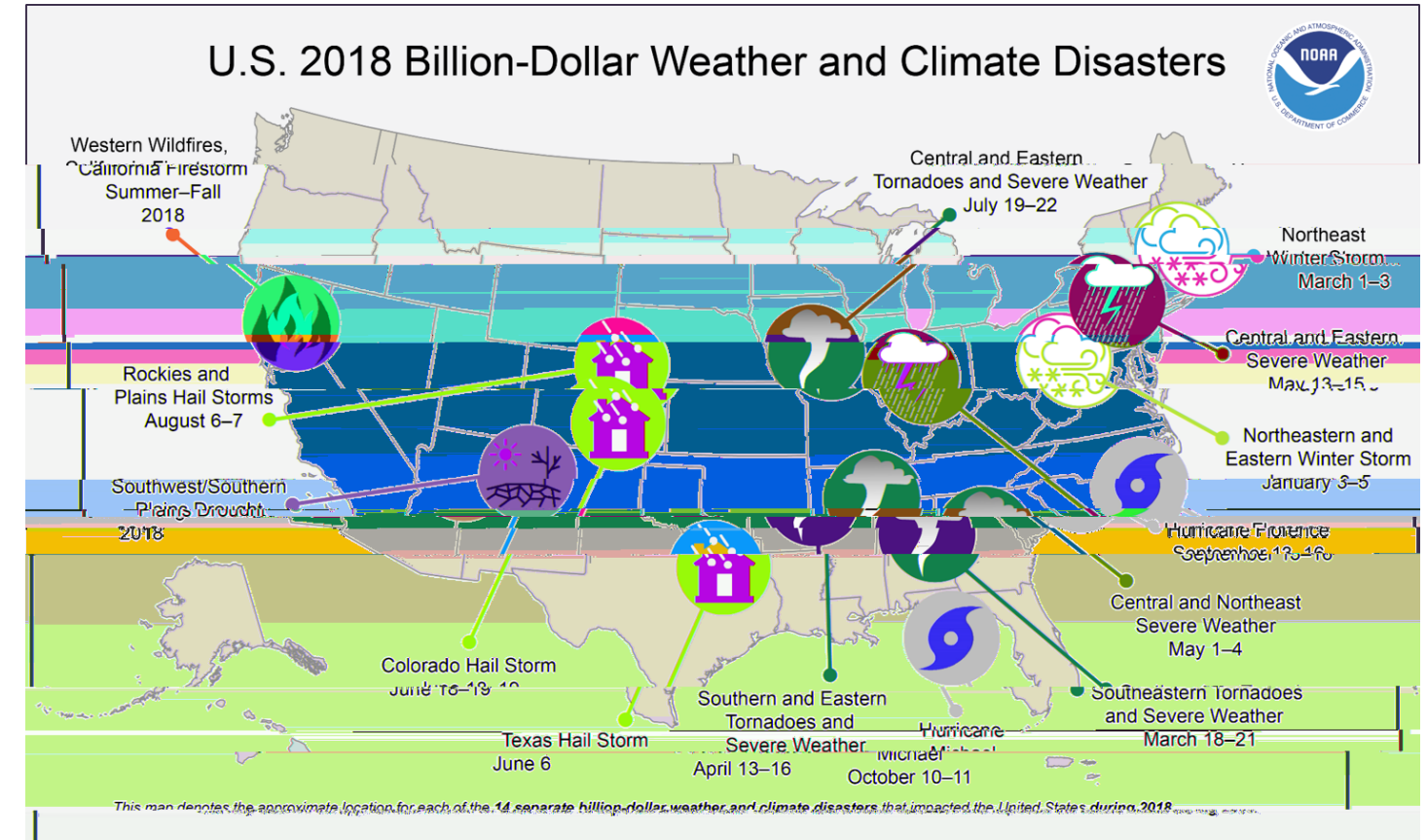
A LATE SEASON SEVERE WEATHER OUTBREAK ACROSS CENTRAL AND SOUTHWEST ILLINOIS

A late season severe weather outbreak across central and southwest Illinois Storm surveys indicated that an outbreak of 29 tornadoes occurred on December 1, 2018 across Illinois, the largest December outbreak since 1957. NOAA’s Storm Prediction Center gave two days advance notice on the potential for severe weather in Illinois. NOAA Weather Forecast Offices in multiple states provided Impact-based Decision Support Services (IDSS) two days in advance with phone calls, briefings, and updates to the emergency management community and government core partners. While the tornadoes struck in December, an unusual time of year for tornado activity in Illinois, NOAA services provided by local offices and the Storm Prediction Center saved lives. There were zero fatalities, only 23 injuries, and advanced warnings for every tornado. The public had an average of 17 minutes to prepare for a tornado after a warning was issued, exceeding NOAA’s goal of 12 minutes.

NOAA strives to achieve a Weather-Ready Nation by enhancing decision support services, improving technology to track and forecast storms, and expanding its dissemination efforts. NOAA aids emergency management, first responders, government officials, businesses, and ultimately the public in making fast, smart decisions to save lives and livelihoods. The combination of advance IDSS and timely warnings sets an example of what Weather-Ready Nation truly looks like, and why it remains an important NOAA goal.

NOAA RESEARCH MODEL BRINGS SEVERE WEATHER INTO FOCUS

NOAA’s two primary short-range weather models, the hourly-updating High-Resolution Rapid Refresh model (HRRR) and its “parent” model, the Rapid Refresh model (RAP),



There were 14 weather and climate disasters with losses each exceeding \$1 billion during 2018. The 14 events, in total, claimed at least 247 lives and had total losses estimated at \$91 billion. About \$73 billion of this total was attributable to three events: Hurricanes Michael (\$25 billion) and Florence (\$24 billion), and the complex of western wildfires (\$24 billion).

received major upgrades in 2018. The HRRR and RAP models provide the foundations for NOAA weather forecasts, and the 2018 upgrades generated key forecast improvements. Forecast periods were dramatically expanded for hazardous weather and flooding potential (from 18 to 36 hours) as well as aviation forecasts (from 21 to 39 hours). The forecast area has also been expanded to include Alaska, where the primary mode of transportation is aircraft and therefore predictions of small-scale details on clouds, visibility, and icing are vital for pilot safety. Storm forecast accuracy is improved, including better precipitation and low-level wind predictions.

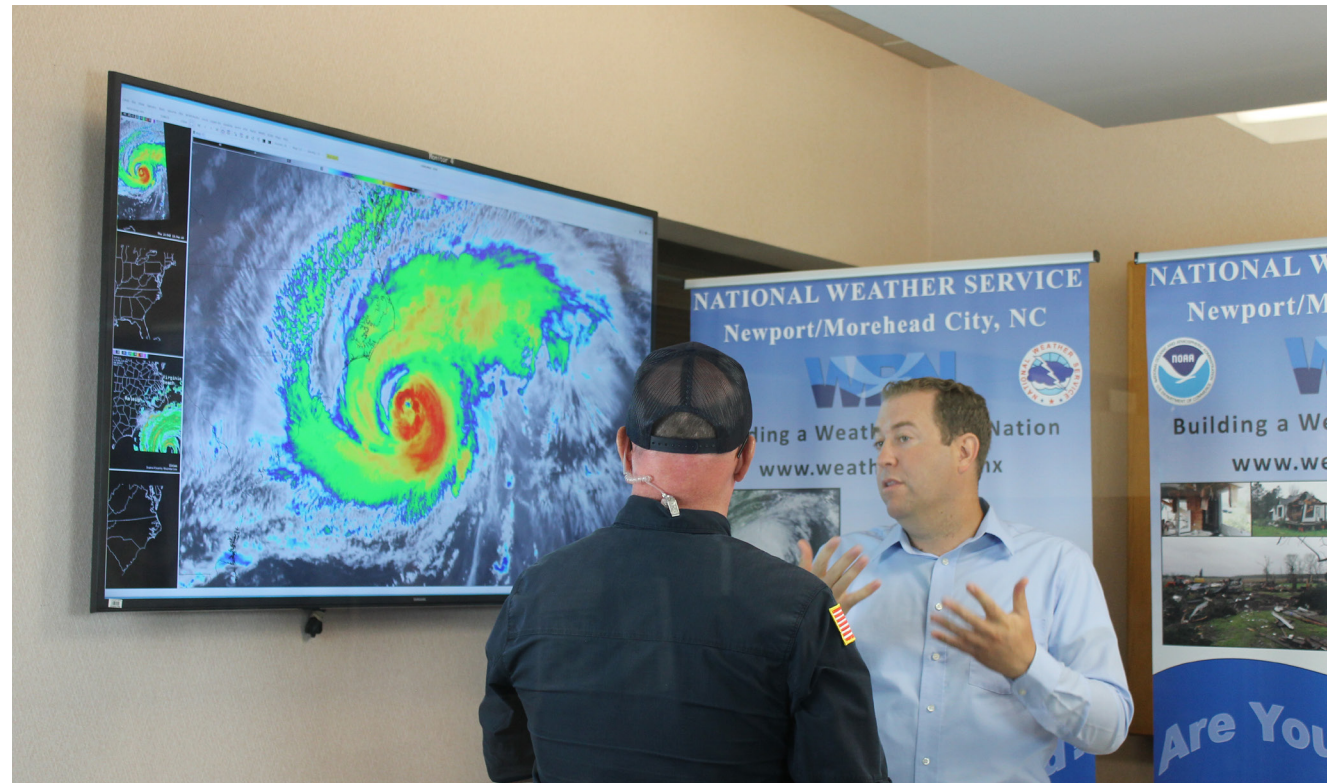
ARGO REACHES TWO MILLIONTH MILESTONE

In early December 2018, the Argo Program, a hallmark of NOAA’s global ocean observing systems, reached a major milestone with its two millionth profile of ocean temperature and salinity conditions. The Argo Program has revolutionized the ability to monitor our

global oceans, providing nearly four times the information as all other ocean observing tools combined. The Argo Program’s data are essential to operational weather and ocean forecasting. Argo is also expanding to the deep ocean with Deep Argo floats capable of measuring to depths of 3.7 miles, helping us understand the largely-unobserved deep ocean and improve our longer-term forecasts. Scientists are currently exploring the possibility of machine learning to improve the Argo program’s data stream, an advance with broader applications including aquaculture, pollution monitoring, and national defense.

ALL IOOS REGIONAL ASSOCIATIONS BECOME NOAA CERTIFIED

NOAA expanded federal-quality observing data to include local assets, and added new utility to non-federal data sources by completing NOAA Certification for all U.S. Integrated Ocean Observing System (IOOS®) Regional Associations. In August, the final Regional



Warning Coordination Meteorologist Erik Heden (NWS Newport/Morehead City, NC) briefs emergency officials as Hurricane Florence approaches the North Carolina coast.

Association was certified as a Regional Information Coordination Entity (RICE). RICEs are nonfederal observing organizations that meet NOAA standards for organizational and data management practices. Once certified, data from these organizations has the full backing of U.S. IOOS® and NOAA. Certification benefits partnerships between the regional association and other federal and nonfederal groups by recognizing them as a credible entity that produces high-quality data. Data from regional associations can be used without spending time and resources on additional quality control. The IOOS Regional Associations fill critical ocean observing information gaps currently providing 65 million meteorological and wave observations per year.

FY 2020 INITIATIVES

The FY 2020 President's Budget builds on strongly bipartisan efforts to protect lives and property through the Weather Research and Forecast Improvement Act of 2017 (Weather Act) and the National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018.

It provides EPIC with \$15 million to advance US weather modelling skill and reclaim international leadership in numerical weather prediction. EPIC responds to the Department of Commerce strategic goal of reducing impacts from extreme weather and water events and contributes to NOAA's efforts to implement the Weather Act. Improvements in leading-edge research-to-operations, data assimilation, and advanced modeling are essential to the advances in our forecasts. To support this, NOAA's FY 2020 budget retains \$3 million for the Joint Technology Transfer Initiative in conjunction with EPIC to shepherd promising weather research into operations and to advance community-developed enhancements to NOAA's foremost weather model, the Next Generation Global Prediction System to address growing service demands and increase the accuracy of weather forecasts out to 30 days.

Ship-based observations constitute one of the most cost-effective opportunities to increase skill of the global prediction system. NOAA will improve its tropical and marine watches and warnings, as well as global weather



LCDR Rebecca Waddington and CAPT Kristie Twining aboard NOAA's Gulfstream IV-SP during a hurricane surveillance flight on 5 August 2018.

models, using \$2.2 million to purchase ship-based meteorological and oceanographic observations, increasing data availability by orders of magnitude. This request responds to Congressional direction through the Weather Act directing NOAA to improve weather forecasting through new sources of data and research. The model for this initiative is the successful Aircraft Observations data buy that has been operating for over 20 years.



Bluestripe snapper, Ta'ape, Threespot damselfish, and Oval Chromis damselfish are seen swimming around Lobe coral.

Priority— Maximize the Economic Contributions of Ocean and Coastal Resources

EXPAND THE BLUE ECONOMY

The global blue economy is poised for growth. As of 2016, coastal counties were home to over 133 million people, or 42% of the U.S. population, and growing at a rate of 0.84% per year. The coasts are economic engines that support jobs in defense, fishing, transportation, and tourism industries; contribute substantially to the U.S. gross domestic product; and serve as hubs of commerce, with seaports connecting the country with global trading partners. Acceleration of human activity in and around the coast is fostering new ways of thinking about the blue economy concept, the role of sustainability in driving markets, resilience of coastal infrastructure and economies, and the science and technology that will innovate new sectors.

NOAA's mission to share knowledge and information on the Nation's climate, weather, oceans, and coasts and to conserve and manage coastal and marine ecosystems and resources uniquely positions the agency to support the Nation's competitiveness in ocean-related segments of the U.S. economy. NOAA contributes value to the economy in two fundamental ways. First, by providing information that people find valuable and

that people use to guide or influence decisions, and second, by managing, or helping to manage, natural resources that are themselves valuable.

NOAA is leading the Administration's efforts to increase the economic impact of the Nation's ocean and coastal resources, working collaboratively with Federal, state, and industry partners, and at the forefront of international discussions on the blue economy. NOAA's blue economy activities will advance the Administration's top priorities by reducing regulatory burdens and increasing economic opportunities and production, in support of Presidential Executive Orders including EO 13840: Ocean Policy To Advance the Economic, Security, and Environmental Interests of the United States and EO 13859: Executive Order on Maintaining American Leadership in Artificial Intelligence.

BELOW ARE SOME OF NOAA'S TOP 2018 ACCOMPLISHMENTS THAT SUPPORT THIS PRIORITY:

NOAA BROUGHT SAFER MARINE NAVIGATION TO MORE U.S. SEAPORTS

NOAA expanded the Physical Oceanographic Real-Time System (PORTS®) to four additional U.S. seaports. Port Miami and Port Everglades in Florida, Port of Toledo in Ohio, and the Port of Corpus Christi in Texas partnered with NOAA to add real-time sensors in their seaports. The program is tailored to local needs by having the partners identify which sensors they need to make the best decisions for safety of life and property. For example, strong currents in the transit into Corpus Christi Bay make it difficult for vessels to navigate. The port authority requested a PORTS® with real-time current meters to provide pilots with information to help them safely arrive and depart the seaport. This information comes at a critical time as the Port of Corpus Christi, already the fourth largest port in the U.S. in tonnage and the leading exporter of U.S. crude oil, set a new record for tonnage this year and still continues to see increases in

vessel size and traffic. Using PORTS®, partners can reduce ship accidents by more than 50 percent, increase the amount of cargo ships can carry, reduce transit delays for commercial traffic, enhance recreational activities, and improve hazardous spill response.

NOAA also conducted surveys in support of new and existing Precision Navigation projects. Precision Navigation is a coordinated effort amongst NOAA programs and partners to address port-specific requirements, including updated navigational charts, real-time oceanographic and geospatial observations, and hydrographic models that forecast key conditions days in advance. NOAA re-surveyed the Port of LA-Long Beach in 2018 to help maintain its current system. NOAA also surveyed the Lower Mississippi River Port complex—one of the first steps for implementing Precision Navigation.

DISCOVERED AND MAPPED NEW DEEP WATER HABITATS

The deep water areas offshore the southeast U.S. continental margin have some of the largest gaps in high-resolution ocean mapping on the East Coast. Exploratory missions, such as those coordinated and funded by NOAA's Office of Ocean Exploration and Research, expand NOAA's capacity to predict the distribution of sensitive deep water habitat to guide potential development of energy and marine mineral resources.

In August and September of 2018, NOAA and partners at the Bureau of Ocean Energy Management and the U.S. Geological Survey conducted a research expedition on the Woods Hole Oceanographic Institution-operated R/V Atlantis to collect critical baseline information about deep water habitats offshore the U.S. Mid- and South Atlantic. A major outcome of the cruise was the discovery of a deep-sea coral reef stretching 85 miles in length. The reef is in an area mapped by NOAA's *Okeanos Explorer* earlier in the year, approximately 160 miles east of



NOAA's remotely operated vehicle Deep Discoverer surveys large amounts of *Lophelia pertusa*, stony coral, at the top of the crest of Richardson Ridge on June 21, 2018 during the Windows to the Deep 2018 expedition aboard NOAA Ship *Okeanos Explorer*.

Charleston. This discovery shows that such coral reefs, which support commercial and recreational fishing, are more prevalent in US waters than previously thought.

The multi-year project involves Federal agencies, academia and industry and is coordinated as part of the National Ocean Partnership Program. Previous field work has used advanced mapping tools such as the autonomous underwater vehicle Sentry, which the NOAA Office of Ocean Exploration and Research routinely supports, including upgrading its capability to utilize Artificial Intelligence and optimize autonomous exploration methods.

Ocean exploration expeditions this year led to the discovery of a new seamount in the Atlantic south of Bermuda, several potentially new marine species, and historic World War II shipwrecks from battles in the waters off Kiska, Alaska. Telepresence technology connected thousands of future deep sea explorers to these discoveries. NOAA Ship *Okeanos Explorer* engaged more than 3,500 people in over 50 live telepresence

interactions from sea and nearly 890 teachers were trained in NOAA sponsored professional development workshops.

REDUCED COMPLETION TIME FOR ENDANGERED SPECIES ACT (ESA) SECTION 7 CONSULTATIONS

NOAA decreased the time to complete environmental reviews by streamlining permitting processes, addressing several Executive Orders¹ predominantly targeted at reducing burden on the public and expediting reviews. Timely consultation with Federal agencies supports infrastructure, jobs, and the economy while incorporating reasonable and prudent measures to minimize harmful impacts to threatened or endangered marine species. NOAA implemented national process improvements and made precedent-setting achievements. These actions included rigorous priority-setting, efficiency improvements, and work with other

¹ E.O. 13783 Promoting Energy Independence and Economic Growth; E.O. 13766 Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects E.O. 13795 Implementing an America-First Offshore Energy Strategy; E.O. 13805 Establishing a Presidential Advisory Council on Infrastructure; E.O. 13807 Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure



Redtide off Little Gasparilla Island, FL. Photo credit: Paul Schmidt

Federal agencies to fast-track their consultations. The results are impressive—in comparison to pre-2018, the time to complete informal ESA consultations was reduced by approximately 65%; formal ESA consultations by 22%; incidental harassment authorizations under the Marine Mammal Protection Act (MMPA) by 25%; and the time to get a research permit for ESA-listed species by 29%.

\$34.3 MILLION GENERATED TO RESTORE COASTS AND ESTUARIES AFTER INDUSTRIAL POLLUTION

In 2018, NOAA generated \$34.3M to restore public natural resources like fish, wildlife, habitats, and recreation in communities across the country. In response to oil spills and industrial pollution, NOAA works to compensate the American public for impacts to their natural resources. This year alone, NOAA reached settlements and agreements in six cases, requiring companies to restore natural resources that were damaged. NOAA will put these funds towards restoring the environment including:

- \$3.1 million to restore Baltimore's 68th Street Dump Superfund Site in Maryland.
- \$4 million to restore salmon habitat in Port Gardner and the Snohomish River in Washington.
- \$3.8 million for the restoration of the She-

boygan River and Harbor Superfund Site in Wisconsin.

- \$6.5 million to provide restoration for injuries to fish and other natural resources for the St. Louis River/Interlake Site in Minnesota.
- \$13.3 million for the restoration of birds from the 2003 Bouchard Barge 120 oil spill in Buzzards Bay between Rhode Island and Massachusetts.
- \$3.6 million to restore fish and wildlife in the Gulf of Mexico off the coast of Louisiana for the Shell Green Canyon oil spill.

DELIVERED CRITICAL FORECASTS TO COMMUNITIES DURING FLORIDA'S HARMFUL ALGAL BLOOM

During the worst harmful algal bloom event in years, NOAA helped reduce the health and economic impacts of red tides for coastal communities by providing more detail than ever in its forecasts. The 2018 southwest Florida bloom extended 130 miles along the coast, causing respiratory irritation in humans. As in the past, NOAA issued twice-weekly forecasts as well as Beach Hazard Statements when the risk of respiratory irritation was high. Hundreds of coastal resource managers, public health officials, and research scientists used these forecasts to take appropriate actions, such as closing beaches and focusing sampling

efforts. These forecasts provide information at the county-level, but even within a county, individual beaches may only be effected for part of the day. So this year, NOAA released a new experimental forecast that predicts risk of respiratory irritation throughout the day for every beach in Pinellas County, Florida. Residents and visitors used this new forecast the same way they use weather reports—to plan beach walks, waterfront dining, and other outdoor activities around the affected beaches. These forecasts are first step toward reducing the health and economic impacts of red tides for coastal communities. NOAA also provides operational HAB forecasts for Texas and Lake Erie, and is running demonstration forecasts in California, the Gulf of Maine, and Washington.

FY 2020 INITIATIVES

The FY 2020 Budget harnesses NOAA's services, resources, and data to help accelerate growth of U.S. businesses, promote ocean industries, and facilitate the development of new technologies that will allow the U.S. to take advantage of the growing blue economy sector.

Aerial and subsea unmanned systems are rapidly evolving in ways that provide more cost-effective approaches to executing NOAA's missions. Building on efforts to increase the blue economy through the Commercial Engagement Through Ocean Technology Act of 2018, NOAA will establish an Unmanned Systems (UxS) Operations Program to provide centralized UxS Support and guidance across NOAA, with an increase of \$4.0 million within the Office of Marine and Aviation Operations. This program will provide oversight and efficient, cost-effective operations of unmanned systems and technologies across NOAA's line offices.

A majority of the Nation's spending on research and development is conducted by the private sector, and many Federal programs are unable to effectively leverage it.

NOAA requests \$5.0 million to establish a dedicated funding source for the National Oceanographic Partnership Program (NOPP) to build upon the small existing program and be used to leverage and improve coordination with other Federal and private sector funds. NOAA is working with NOPP to offer extramural grants in areas including ocean exploration, aquaculture, marine debris, and the impacts of underwater sound on marine mammals.

Executive Order 13840, Ocean Policy to Advance the Economic, Security, and Environmental Interest of the United States Data Platforms is intended to advance the economic, security, and environmental interests of the United States through improved access to credible marine data and information. This Budget includes an increase of \$4.0 million for regional ocean data portals that will provide ocean-related Federal data and information to the public to inform regional, coastal, and ocean management decision-making across the United States. These platforms will also support automated siting and analysis through the use of big data as promoted in the Executive Order 13859 to Maintain American Leadership in Artificial Intelligence.

This Budget will continue to focus on providing timelier, consistent, and clear consultations and authorizations under ESA and MMPA, reducing the burden on the regulated community. As noted, NOAA has made significant gains streamlining ESA and MMPA permitting processes, and will continue to address permitting capacity with available resources.

Approximately 90 percent of U.S. trade is transported via maritime commerce, and industry is rapidly changing with the entry of larger, Panamax vessels in U.S. ports. This Budget responds to these new challenges with an investment to support a data dissemination site for Precision Navigation. Precision Navigation, which was successfully



Blue Ocean Mariculture open ocean fish pen off the coast of Kona, HI.

demonstrated in the Port of Long Beach, provides mariners with the information they need to make real-time navigational decisions in any given sea condition, directly resulting in significant cost-savings.

Marine Debris is a global problem that can threaten wildlife, navigation safety, economic activity, and human health. This Budget includes an investment to improve international coordination to address marine debris at its sources as promoted by the Save Seas Act of 2018 which reauthorized NOAA's Marine Debris Program.

Commercial fishing, research and recreational activities at all National Marine Sanctuaries generate \$8 billion each year for local coastal communities. NOAA anticipates designating one or more new sanctuaries in 2019. This budget includes an investment to accelerate the benefits of these new marine sanctuaries.

REDUCE THE SEAFOOD TRADE DEFICIT

The U.S. trade deficit in seafood has grown to over \$16 billion. NOAA is implementing a comprehensive approach to reduce the seafood trade deficit and promote economic development. These efforts include expanding aquaculture production, reducing unnecessary

regulations on domestic wild-caught fisheries, and ensuring fair trade with exporting nations.

The U.S. has the second largest Exclusive Economic Zone (EEZ) in the world, but ranks 16th in the world in aquaculture. Commercial marine aquaculture has not flourished in U.S. waters due to an uncertain and conflicting regulatory environment. To overcome these burdens and substantially increase domestic aquaculture production over the next decade, NOAA aims to facilitate permitting and siting of aquaculture facilities, promote business development, and advance research.

The U.S. leads the world in sustainable fishery management through a stakeholder driven process with eight Regional Fishery Management Councils (Councils) resulting in over \$212 billion contribution to the U.S. economy and 1.7 million jobs. NOAA is committed to reducing the regulatory burden on the U.S. domestic seafood industry to promote seafood production and competitiveness. To increase value from our federally-managed fisheries and fully utilize these resources, NOAA is working closely with the Councils on appropriate revisions to regulations to make our fishermen more effective, efficient, and competitive.

Imports account for more than 85% of seafood

consumption, and U.S. seafood exports often face unfair trade agreements, tariffs, and policies. NOAA began the Seafood Import Monitoring Program in January 2018, which is described further below. NOAA is also beginning to implement related rules including the Commerce Trusted Trader Program, Marine Mammal Protection Act comparability standards, and revisions to Inspection and Certification Regulations. These trade rules incentivize adoption of robust seafood traceability and supply chain verification, eliminate outdated regulatory requirements, and streamline the seafood safety certification process. These rules will help maintain a level playing field and reduce inspection requirements and associated costs to U.S. seafood producers.

BELOW ARE SOME OF NOAA'S TOP 2018 ACCOMPLISHMENTS THAT SUPPORT THIS PRIORITY:

IMPLEMENTED SEAFOOD IMPORT MONITORING PROGRAM—A MAJOR STEP FORWARD IN COMBATING ILLEGAL, UNREPORTED, AND UNREGULATED (IUU) FISHING AND SEAFOOD FRAUD

Illegal and unregulated fishing, unfair trade practices by other nations, and deceptive labeling of seafood products are key challenges faced by U.S. fishermen. NOAA is making significant steps in combating IUU fishing and seafood fraud through its Seafood Import Monitoring Program (SIMP). In January 2018, NOAA launched this program which established reporting and record-keeping requirements for eleven of our most popular species vulnerable to IUU fishing. The program is also expanding in 2019 to include abalone and shrimp imports. The inclusion of abalone and shrimp—the largest U.S. seafood import—doubles the quantity of imports covered by the program. The traceability information collected at the time of entry into U.S. commerce has improved sharing and analysis of data among regulatory and enforcement authorities. The SIMP aids global food security and provides additional protections for our national economy, the

sustainability of our shared ocean resources, and levels the playing field for law abiding fishermen and associated industries.

REDUCED REGULATORY BURDEN ON THE AMERICAN PUBLIC WHILE ALSO PROMOTING RESPONSIBLE FISHING PRACTICES

As part of the government-wide effort to address Executive Orders² to reduce unnecessary and ineffective regulatory burdens, NOAA implemented cost-saving regulations with a net present value of \$695 million in fiscal year 2018 (estimated in perpetuity at a 7% discount rate). In all, the Department of Commerce implemented 14 deregulatory actions, 10 of which came from NOAA. Deregulatory actions can support increased utilization of fisheries resources, while still achieving conservation objectives, and reduce fishermen's costs. Notably, NOAA was highlighted in a regulatory reform statement by the White House for reducing "burdensome red tape while also promoting responsible fishing practices." The cost-saving regulation cited by the White House opened areas off the coast of New England to commercial sea scallop harvesting for the first time in years and provided \$654 million of the estimated \$695 million in cost savings for fiscal year 2018.

FY 2020 INITIATIVES

The FY 2020 investments in this priority uphold NOAA and DOC's commitments outlined above.

This Budget includes an investment to support aquaculture production by assisting industry with regulatory compliance and conducting priority research. NOAA would help to identify optimal locations and provide technical assistance with navigating complicated state and Federal regulations. Funding also supports Federal labs to study feed options, disease, hatchery production, and other challenges

² Executive Order 13777 Enforcing the Regulatory Reform Agenda; Executive Order 13771 Reducing Regulation and Controlling Regulatory Costs

faced by industry. NOAA will continue working with regional pilot projects in collaboration with industry and other partners, and develop, test, and transfer the results of aquaculture research to the seafood industry in a manner that benefits the Nation's economy and creates new jobs.

In order to further reduce the regulatory burden, the Regional Fishery Management Councils reviewed all existing regulations and identified those that are outdated, unnecessary, or ineffective. Based on these reviews, the Councils and NOAA are prioritizing and taking action to revise or remove those regulations. This Budget includes an investment to support the Councils as they review and process these actions. Regulations will be revised or removed as appropriate to increase economic value and improve recreational activities.

When it comes to imports, American fishermen deserve a level playing field. Unfortunately, imported seafood is often caught using gear and fishing practices that are prohibited in our own country. This Budget includes an increase of \$1.6 million for fisheries enforcement needed to further implement the SIMP to improve the detection of IUU fishing and seafood fraud. NOAA will expand partnerships, hire and deploy additional officers and special agents, and conduct forensic analyses to implement the IUU Task Force recommendations.



Commercial fisherman.



GOES-S, now GOES-17, launched into orbit from Cape Canaveral, Florida on March 1, 2018. GOES-17 is the second satellite in a series of next-generation NOAA weather satellites. Once operational, GOES-17 will operate as GOES West, and will track storm systems, lightning, wildfires, dense fog and other hazards. GOES-17 will significantly enhance our ability to forecast the weather in the western United States, especially in Alaska and Hawaii.

Priority— Space Innovation

Satellite observations have been central to meeting NOAA's mission since the launch of the first operational satellite in 1970. 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. NOAA recently conducted an in-depth analysis of future space segment architecture decisions, the NOAA Satellite Observing System and Architecture (NSOSA). NSOSA analyzed 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. Evolving to a more mission-effective, integrated, adaptable, and affordable mission architecture will allow NOAA to respond to changing technology, emerging partnerships and evolving observation requirements. Congress recognized the importance of NSOSA, codifying the program in the National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018 (Public Law 115-423).

NOAA's Space Innovation initiative, based on NSOSA, will inform decisions on the next generation of satellite architecture required to meet NOAA's weather forecasting mission. This initiative is the critical next step to ensure continuity of space based observations. The development and deployment timeline for high-performance operational space assets is 10–15 years. NOAA must begin on-orbit

replenishment of the current constellation in the 2027–2032 timeframe to minimize the risk of observations capability shortfalls, so development of the follow-on systems must begin now.

For the U.S. 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.

BELOW ARE SOME OF NOAA'S TOP 2018 ACCOMPLISHMENTS THAT SUPPORT THIS PRIORITY:

GOES-17 LAUNCHES INTO ORBIT

GOES-17, formerly known as GOES-S, launched on March 1, 2018, becoming the second satellite in the fourth generation of GOES-R Series. As an operational satellite,

GOES-17 takes its place as GOES West, with GOES-16 in the GOES East position. The GOES-R Series satellites provide advanced imagery and atmospheric measurements of Earth's weather, oceans and environment, real-time mapping of total lightning activity, and improved monitoring of solar activity and space weather. During the geostationary checkout period, GOES-17 showcased its capabilities through high-definition instruments and ground systems as it tracked major hurricane systems, severe storm systems, and wildfires across the western United States. Over the coming years, GOES-17 will improve the secure and timely access to global environmental data and information to promote and protect the Nation's security, environment, economy, and quality of life.

CREATION OF THE NOAA SATELLITE OBSERVING SYSTEM ARCHITECTURE

NOAA recently conducted an in-depth analysis of future space segment architecture

decisions, the NOAA Satellite Observing System Architecture (NSOSA)¹, to become a more mission-effective, integrated, adaptable, and affordable satellite portfolio. NOAA is using the NSOSA study as a tool to inform future space segment architecture decisions. The study allows NOAA to design a modern architecture by broadly examining instruments, services, platforms, and orbits, driven by user needs, new technology, and exploiting emerging space business models. As NOAA continues to evaluate findings from the NSOSA tool it will be refine estimates to further influence future acquisition decisions. The details of the NSOSA study were widely briefed to stakeholders, including at the American Meteorological Society (AMS) annual meeting, the Small Satellite Conference, and a Community Day focused specifically on the NSOSA study.

NOAA-20 BECOMES OPERATIONAL

NOAA-20, formerly Joint Polar Satellite System-1 (JPSS-1), became fully operational on May 30, 2018, following its on-orbit checkout. Successfully launched on November 18, 2017, NOAA-20 is the first of four next-generation polar-orbiting satellites, continuing the high quality data that Suomi NPP provides. NOAA-20 circles the Earth from pole-to-pole and crosses the equator about 14 times daily to provide full global coverage twice a day. The data and products from NOAA-20 will improve the ability of National Weather Service to forecast and observe environmental phenomena and severe weather in real-time, helping to save lives and protect local economies. NOAA-20 carries five instruments that improve day-to-day weather forecasting while extending the record of many long-term observations of Earth's climate. NOAA-20 provides critical ocean color observations for monitoring harmful algal blooms (HABs) and the health of important fisheries habitats, and supports decisions

by resource managers to mitigate impacts. Utilizing NOAA-20 data, NOAA forecasts severe weather events, such as hurricanes from the Pacific Ocean to the Atlantic Ocean and Gulf of Mexico, while also assessing environmental hazards, including drought, poor air quality, fog, and harmful algae in coastal waters.

FY 2020 INITIATIVES

NOAA's FY 2020 submission makes several targeted investments to transform its future satellite architecture in alignment with NSOSA findings and to further inform future acquisition decisions. Partnerships with other agencies and the commercial sector along with focused industry studies, analyses, and potential flight demonstrations will enable NOAA to focus its resources on future observation requirements. The FY 2020 Budget will allow NOAA to make targeted investments in these partnerships to guide the support and development of promising technologies. The initial investment of \$2.3 million to the Joint Venture Partnership will enable NOAA to leverage our partners' investments, and advance their readiness to meet NOAA's observational needs, both in the near term and continuing after GOES-R/JPSS observational needs. The National Academies' 2017 Earth Science and Applications from the Space Decadal Survey recommended that NOAA and NASA develop a cost effective and joint framework for identifying and executing activities that advance NOAA's observation capabilities; the Decadal Survey also recommended that NOAA provide funding to support its share of the collaboration.

By taking advantage of hosting opportunities in the geostationary orbit, NOAA may be able to obtain critical weather observations more cost-effectively than building multiple large, dedicated satellites. NOAA is investing \$10 million in Geostationary and Extended Orbits to look at hosted opportunities in which NOAA may also be able to use commercial

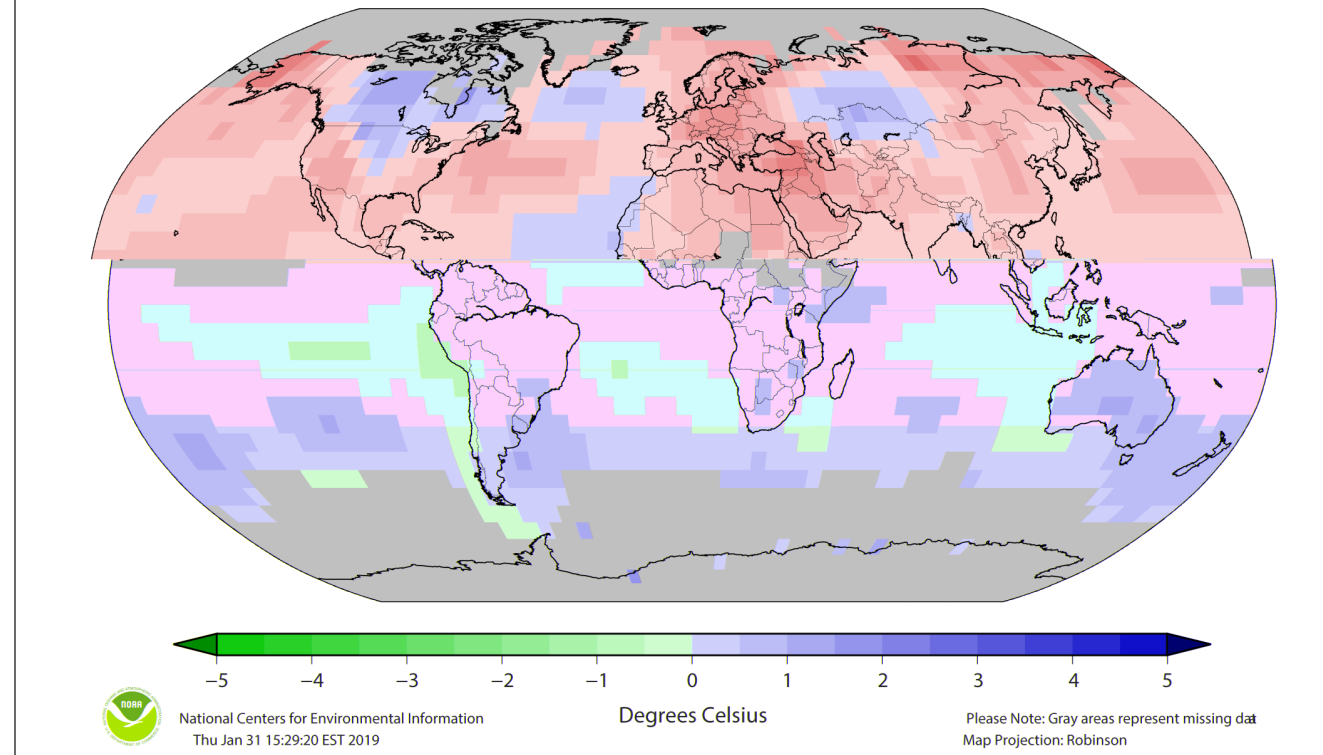


JPSS-1, now operationally known as NOAA-20, at liftoff.

¹ Codified in S.2200, "National Integrated Drought Information System Reauthorization Act of 2018" (P.L. 115-423).

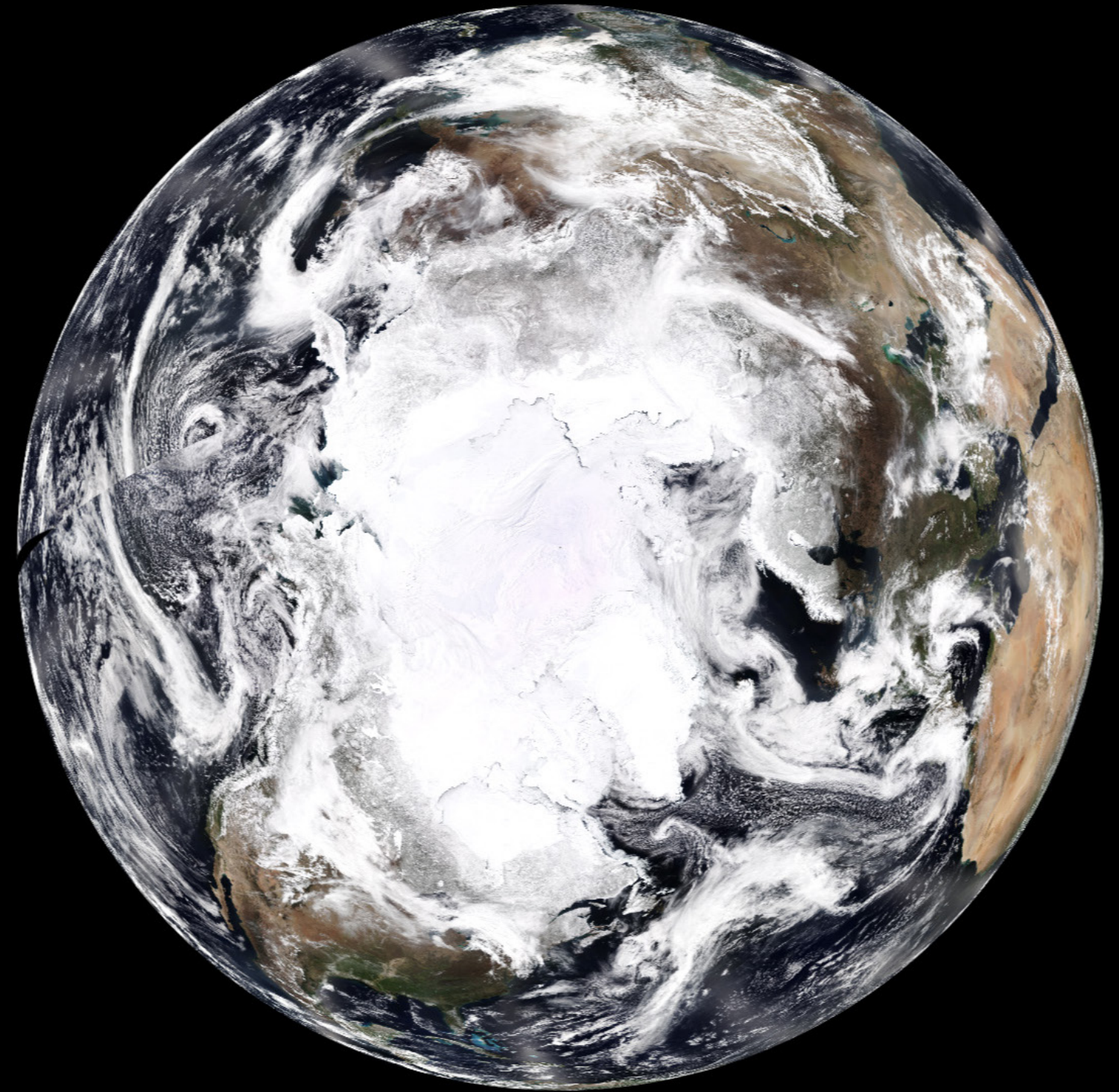
Land & Ocean Temperature Departure from Average Jan–Dec 2018 (with respect to a 1981–2010 base period)

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



According to NOAA's 139-year record, 2018 was the fourth warmest year. This map shows 2018 annual departures from the average temperature departures from the 1981-2010 base period around the globe. 2018 marks the 42nd consecutive year (since 1977) with global land and ocean temperatures at least nominally above the 20th century average.

spacecraft for technology demonstrations to quickly deploy and evaluate the benefit of new instruments to meet mission requirements. In response to two Commercial Weather Data Pilots studying the feasibility of NOAA purchasing Radio Occultation (RO) data from the commercial sector, NOAA is requesting \$5 million to purchase commercial Global Navigation Satellite System (GNSS) RO data for operational use. This request will also support continued development of the infrastructure and capability to securely import, transfer, process, store, and use external data from commercial partners for operational use.



NOAA's newest polar-orbiting satellite, NOAA-20, captured this magnificent view of the Earth's North Pole on April 12, 2018. By passing over the pole 14 times a day, the satellite's Visible Infrared Imaging Radiometer Suite (VIIRS) instrument was able to create this composite image of the planet, centered over the frozen Arctic, from 512 miles above Earth.

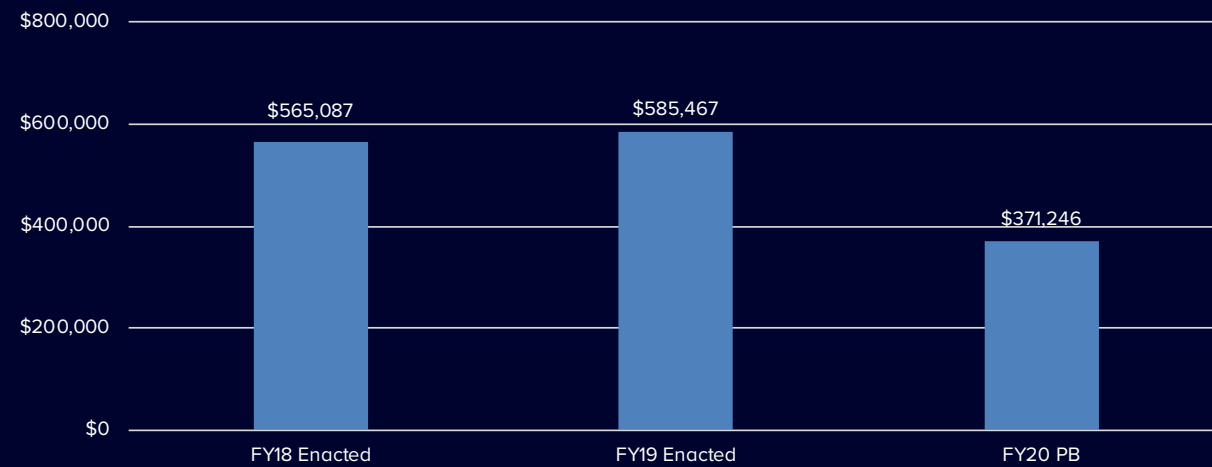
National Ocean Service

NOAA's National Ocean Service (NOS) enables safe, sustainable, and efficient use of marine and coastal resources. It does so by gathering oceanographic observations and providing data to users; conducting and applying research for sustainable management, protection, and restoration of ocean and coastal resources; and using place-based approaches to achieve sound resource management. NOS's science-based products and services support coastal economic activity, reduce risk to life and property on the coast, and promote more effective protection and use of coastal resources.



NOS Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

In FY 2018, NOS provided data, tools, and services that support coastal economies and their contribution to the national economy. NOS worked to close gaps in observations and maintain data, tools and services like navigation charts and the national coordinate system that promote safe and efficient transportation and commerce. Scientists in NOS helped communities better prepare for and respond to a variety of threats, including this year's active hurricane season and harmful algal blooms in the Gulf of Mexico. NOS also provided additional resource protection, characterization, assessment, monitoring, and education activities to better promote and protect special coastal and marine places. National Ocean Service highlights include:

In 2018, NOAA and the United Nations Environment Programme co-hosted the Sixth International Marine Debris Conference in San Diego, California. The conference brought together more than 700 participants from more than 50 countries to work towards a marine debris-free ocean. Efforts like these help advance the priorities of the Save Our Seas Act, an important piece of legislation for promoting international action to reduce marine debris in our ocean.

NOAA finished collecting airborne gravity data for all of mainland Alaska. This new information will be included in revised gravity models for the region and will culminate in a new national vertical reference system. Estimates show that this new system will result in an estimated \$522 million in nationwide annual economic benefits, allowing users to determine more precise elevations using GPS.

After considerable discussion and input from the public, a gas production platform within Flower Garden Banks National Marine Sanctuary was decommissioned and added to the Texas Artificial Reef Program. Oil rig workers and saltwater anglers have long observed that off-shore gas and oil platforms act as artificial reefs, attracting and enhancing fish populations. The majority of the platform will be left in place for divers and anglers to continue enjoying for years to come.

NOS helped coastal managers and aquaculture businesses in California, Florida, and New York identify thousands of acres suitable for offshore aquaculture development through siting assessments. Based on analyses of a variety of spatial data, these assessments are facilitating the permitting and development of commercial aquaculture, while minimizing

conflict with existing uses of ocean space.

FY 2019

In FY 2019, NOS is sustaining core programs, while expanding observational capabilities, improving science to understand and mitigate harmful algal blooms, and helping communities better manage their coastal resources. NOS highlights include:

NOAA is developing Precision Navigation projects for the Port of New York New Jersey and the five ports making up the Lower Mississippi River.

NOAA anticipates designating one or more national marine sanctuaries in 2019 and working with interested local communities on several other potential new or expanded sanctuaries.

NOAA will support Regional Data Portals and regional ocean partnerships, or their equivalent, to enhance their capacity to support regional coastal, ocean, and Great Lakes management priorities as outlined in Executive Order 13840. This support will be coordinated by NOAA's Office for Coastal Management and the Integrated Ocean Observing System.

FY 2020 REQUEST \$391,551,000

NOAA requests a total of \$391,551,000 in discretionary and mandatory funds for NOS mission functions. This total includes Operations, Research, and Facilities (ORF); Procurement, Acquisition, and Construction (PAC); and other mandatory accounts and includes a net decrease of \$219,092,000 in FY 2020 program changes.

The FY 2020 request prioritizes NOS's core functions: mapping and charting; oceanographic observations and earth positioning data; ecological science and monitoring; response and restoration; and protection

of key marine resources. While this request reduces extramural grants, NOS will continue to provide partners with national-level coordination and technical assistance.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Program, Project, and Activity (PPA) is located in Appendix 3. Detailed descriptions of program changes are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$369,705,000 to support the Operations, Research, and Facilities activities of the NOS, reflecting a net decrease of \$216,733,000 in FY 2020 program changes.

NAVIGATION, OBSERVATIONS AND POSITIONING \$192,785,000

NOAA requests a net decrease of \$36,503,000 in program changes for a total of \$192,785,000 in the Navigation, Observations, and Positioning activity. Funds in this activity will support physical oceanographic observations and applications for the safe and efficient use of coastal waterways. This total includes an investment to improve marine transportation services through a national dissemination site for NOAA's Precision Navigation data and products.

COASTAL SCIENCE AND ASSESSMENT \$54,398,000

NOAA requests a net decrease of \$42,255,000 in program changes for a total of \$54,398,000 in the Coastal Science and Assessment activity. Funds in this activity will support applied research and scientific information for disaster response and management, protection, and restoration of ocean and coastal resources. This request includes an investment to improve international coordination and develop a strategy to reduce

A NOAA marine debris removal team hauls a mass of nets out of the water near Midway Atoll.



sources of marine debris, with a total of \$7.1 million for the Marine Debris Program. It also includes an additional investment to reduce the backlog of Natural Resource Damage Assessment cases.

OCEAN AND COASTAL MANAGEMENT AND SERVICES \$122,522,000

NOAA requests a net decrease of \$137,975,000 in program changes for a total of \$122,522,000 in the Ocean and Coastal Management and Services activity. Funds in this activity will support place-based, community, and regional approaches to achieve sound management and sustainable use of coastal and marine resources. This total includes an investment to accelerate the economic benefits of new marine sanctuaries. Program change increases include:

Ocean and Coastal Management and Services: Increase funding for Ocean Data Platforms: NOAA requests an increase of \$4,000,000 to provide grants that increase regional capacity to administer ocean data portals. This will help implement Executive Order 13840, Ocean Policy to Advance the Economic, Security, and Environmental Interest of the United States (June 2018) by improving access to credible marine data and information. Ocean data platforms will provide ocean-related Federal data and information to the public to inform regional, coastal, and ocean management decision-making across the United States.

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$1,541,000 to support the Procurement, Acquisition, and Construction activities of the NOS, reflecting a decrease of \$2,359,000 in FY 2020 program changes.

NOS CONSTRUCTION \$1,541,000

NOAA requests a decrease of \$2,359,000 in program changes for a total of \$1,541,000 in the NOS Construction activity. These funds

will support capital costs of maintaining the Marine Sanctuary Program's facilities and small boat fleet.

MANDATORY FUNDS DAMAGE ASSESSMENT AND RESTORATION REVOLVING FUND

The Damage Assessment and Restoration Revolving Fund was established in 1990 under Section 1012(a) of the Oil Pollution Act to facilitate (1) natural resources damage assessments and (2) restoration, replacement, or acquisition of injured or lost natural resources, including resources of National Marine Sanctuaries and National Estuarine Research Reserves, tidal wetlands, and other habitats for which NOAA is a trustee. The fund receives proceeds from claims against responsible parties as determined through court settlements or agreements.

SANCTUARIES ENFORCEMENT ASSET FORFEITURE FUND

The Sanctuaries Enforcement Asset Forfeiture Fund receives proceeds from civil penalties and forfeiture claims against responsible parties, as determined through court settlements or agreements, for violations of NOAA sanctuary regulations. Penalties received are spent on resource protection within a sanctuary in which the violation occurred.

GULF COAST ECOSYSTEM RESTORATION SCIENCE, OBSERVATION, MONITORING, AND TECHNOLOGY FUND

The Gulf Coast Ecosystem Restoration Science, Observation, Monitoring, and Technology Fund provides funding for the NOAA RESTORE Act. The purpose of this program is to initiate and sustain an integrative, holistic understanding of the Gulf of Mexico ecosystem and support restoration efforts and the long-term sustainability of the ecosystem.



Coastal recreational fishermen.

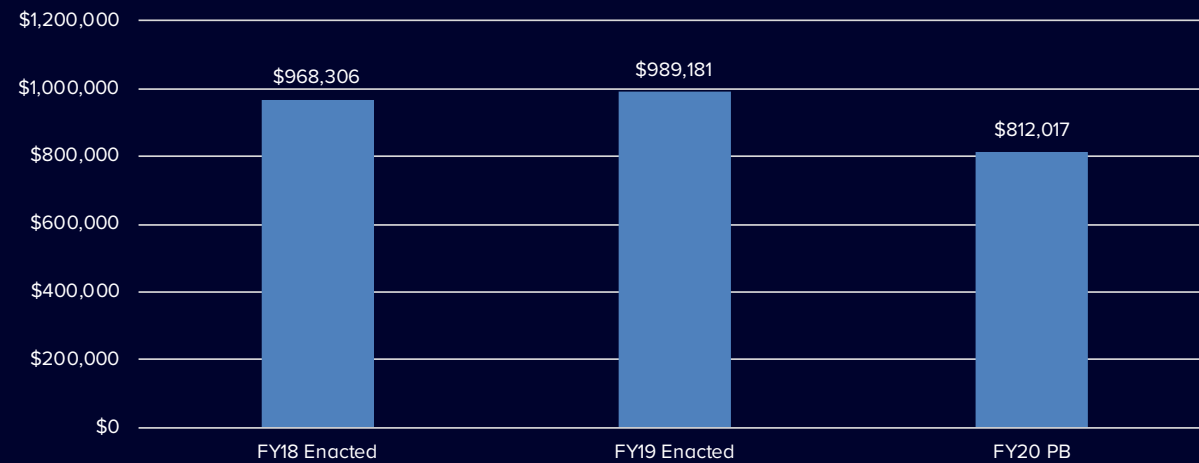
National Marine Fisheries Service

NOAA's National Marine Fisheries Service (NMFS) is responsible for the stewardship of the nation's ocean resources and their habitat. We provide vital services for the nation, which ensure: productive and sustainable fisheries, safe sources of seafood, the recovery and conservation of protected resources, and healthy coastal habitats—all backed by sound science and an ecosystem-based approach to management. NMFS manages 474 marine and anadromous fish stocks within the U.S. Exclusive Economic Zone (EEZ) as well as invertebrates, sea turtles, marine mammals, and other marine and coastal species and their habitats. The work of NOAA and partners support our oceans' resources promoting trade, jobs, and industry growth in commercial and recreational fisheries, aquaculture, tourism, and resource use while supporting various marine species facing extinction. U.S. commercial and recreational saltwater fishing provides significant contributions to our economy, which include 1.7 million jobs, \$212 billion in sales impacts, \$64 billion in income impacts, and almost \$100 billion in value-added impacts to the U.S. economy.¹

¹ National Marine Fisheries Service. 2018. Fisheries Economics of the United States, 2016. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-187. Available at: <https://www.fisheries.noaa.gov/resource/document/fisheries-economics-united-states-report-2016>.

NMFS Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

In addition to the accomplishments found in Chapter 1 regarding streamlining permitting and consultations, reviewing regulations for necessity, and combating IUU fishing, the achievements below further highlight NMFS efforts in 2018.

As a result of the combined efforts of NOAA, the regional fishery management councils, and other partners, the number of domestic fish stocks listed as overfished has reached an all-time low (down from 24 to 15 percent since 2007), with three species of West Coast rockfish rebuilt to sustainable levels.² One of these stocks, Pacific Ocean perch, has been fully rebuilt after 18 years, 34 years ahead of the rebuilding schedule. Now commercial fishermen, no longer affected by area closures, will experience higher catch levels of Pacific groundfish.

NOAA provided \$1.5 million to support 14 pilot projects through the interstate fisheries commissions in support of sustainable marine aquaculture. Selected projects are developing techniques and business models to increase

domestic seafood production, prioritizing less commercially developed technologies for finfish, shellfish, and seaweed, and addressing other industry barriers.

DOC and NOAA issued exempted fishing permits to five states to test new and innovative ways to manage recreational red snapper fishing in the Gulf of Mexico. The permits allow those states to manage recreationally caught red snapper in both state and Federal waters, and test data collection methods through two-year pilot programs.

NOAA is working with partners to develop and use powerful, cutting-edge technologies for conducting surveys (e.g., autonomous aerial, underwater, and sailing drones, advanced sensors, molecular genetics, digital platforms, electronic reporting and monitoring, mobile applications, cloud computing), improving the accuracy of observing systems, and collecting and sharing data through cost effective, transparent, and real-time approaches. NOAA joined forces with Saildrone Inc. to test the first use of autonomous wind and solar-powered vehicles to gather essential data on West Coast fish populations—including commercially valuable species such as hake, sardine, and anchovy—to assess how autonomous

sailboats may augment ship-based fisheries and ecosystem surveys. NOAA has also been working on Saildrone technology with partners for the past several years in Alaska to gather oceanographic, marine mammal, and fish population data.

FY 2019

In FY 2019, NMFS will continue our priority efforts to rebuild overfished stocks and prevent overfishing; assess, understand, and protect the health of protected species; promote sustainable aquaculture production; and combat IUU fishing and seafood fraud. We will take advantage of new technologies, increase efficiencies, and streamline business practices. Examples of priority actions include:

Continue the progress made in FY 2018 to streamline and improve consultation efficiency. NMFS will focus on providing improved guidance to applicants of Incidental Harassment Authorizations or Incidental Take Regulations to reduce the need for additional information and time to conduct analyses. In addition, NMFS will continue to expedite review of hatchery and genetic management plans on the West Coast.

Work to ensure U.S. fisherman are not disadvantaged by IUU, unfair trade practices, or deceptive labeling of seafood products. The



Bags of clams packaged for sale.

agency will enhance seafood import traceability from point of production to entry into U.S. commerce, expanding on the current Seafood Import Monitoring Program (SIMP) by including protocol for U.S. aquaculture of shrimp and abalone. NMFS also proposed a rule to establish a Commerce Trusted Trader Program to streamline the requirements for U.S. importers who commit to establishing internal traceability and auditing measures. It is intended to reduce costs to both the government and industry, and streamline processing of import entries.

Improve the competitiveness of U.S. seafood by providing inspection, certification, and traceability services to strengthen the confidence in the quality and safety of U.S.-produced seafood entering global markets; support domestic seafood business access to export markets through industry outreach, trade analysis, advocacy for trade-friendly import regulations, and negotiated certification agreements; and provide the science and education to support continuous improvement of seafood quality management practices, processing efficiency, and delivery to market by U.S. seafood producers.

Work as quickly as possible to plan for and distribute funding appropriated by Congress in 2018 and 2019 to communities affected by fisheries disasters. The Administration is also working on providing greater clarity and improved consistency with respect to fisheries disaster declaration and funding processes. The changes under consideration will accelerate the Department's responsiveness to fishery disaster requests, help get appropriated funds distributed to affected communities in a timelier manner, and contribute to the long term environmental and economic sustainability of the fishery.

Promote domestic seafood production, create jobs and reduce regulatory burdens, and drive aquaculture research to ensure the continued growth of this industry. The agency will

² National Marine Fisheries Service. 2018. Status of Stocks 2017. Available at: <https://www.fisheries.noaa.gov/feature-story/status-stocks-2017>

facilitate regulatory efficiency and cross-agency reviews for Federal permitting, and provide science, including coastal planning and siting, disease prevention, and genetics research. NMFS will continue to fund regional pilot programs and research in off-bottom oyster production.

FY 2020 REQUEST \$842,670,000

NOAA requests a total of \$842,670,000 in discretionary and mandatory funds for NMFS mission functions. This total includes Operations, Research, and Facilities (ORF) and other accounts, and includes a net decrease of \$189,954,000 in FY 2020 program changes. The FY 2020 request prioritizes NMFS core functions, such as the government's legal obligations to manage and conserve marine resources, and NMFS will continue to expand upon the important accomplishments and priorities above with available resources.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Subactivity is located in Appendix 3. Detailed descriptions of program changes are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$811,668,000 to support the Operations, Research, and Facilities activities of NMFS, reflecting a net decrease of \$109,954,000 in FY 2020 program changes.

PROTECTED RESOURCES SCIENCE AND MANAGEMENT \$186,516,000

NOAA requests a decrease of \$13,496,000 in program changes for a total of \$186,516,000 in the Protected Resources Science and Management activity. Funding will support actions such as stabilizing the highest priority protected species; minimizing bycatch and entanglement while supporting fisheries;

supporting the balance of water management for protected species with other uses; and continuing to streamline permitting with partner agencies, to support infrastructure, jobs, and the economy while minimizing impacts to protected species. This total includes an investment in permitting capacity to reduce the burden on the regulated community by providing timelier, consistent, and clear consultations and authorizations.

FISHERIES SCIENCE AND MANAGEMENT \$533,205,000

NOAA requests a decrease of \$60,522,000 in program changes for a total of \$533,205,000 in the Fisheries Science and Management activity. Funding will support actions such as managing stocks for optimum yield while preventing overfishing; assessing prioritized stocks and maintaining information for currently assessed stocks; modernizing fishery information collection, management, and dissemination; enhancing cooperative data collection and sharing; and combating IUU fishing and seafood fraud, and advancing fair trade. The Budget includes an investment to work closely with regional fishery management councils to analyze and issue revised regulations, where appropriate to reduce the burden on commercial and recreational fishermen; and an investment to streamline



Staff from the NOAA Fisheries Milford Lab place Go Pro cameras on oyster cages to document interactions with the local environment.



An investigation by NOAA's Office of Law Enforcement led to felony charges against a Virginia seafood company for selling foreign crabmeat labeled as more expensive domestic blue crab.

permitting and advance aquaculture research to enable a robust U.S. marine aquaculture industry.

ENFORCEMENT \$54,072,000

NOAA requests a net decrease of \$16,686,000 in program changes for a total of \$54,072,000 in the Enforcement activity. In addition to the program change increase below, funding will support traditional enforcement including investigations and patrols focusing on strategic Ports of Entry; technological tools such as Vessel Monitoring Systems; outreach and education designed to increase voluntary compliance with environmental laws and regulations; and international IUU enforcement training and technical assistance. Program change increases include:

Enforcement: Enforcement and Seafood Import Monitoring: NOAA requests an increase of \$1,593,000 to improve the detection of IUU fishing and seafood fraud. IUU fishing weakens profitability for legally caught seafood, fuels illegal trafficking operations, and undermines economic opportunity for legitimate fishermen. This funding builds upon the existing funds for IUU enforcement and SIMP and will create and expand partnerships with other Federal agencies, as well as state and local governments. NMFS will implement the IUU Task Force recommendations and hire additional enforcement officers and special agents; support counsel staff; and conduct

outreach to stakeholders, supply chain managers, and consumers, as well as further engage with seafood producers. The funding will increase investigations and interdiction of suspected illegal imports involving SIMP, IUU, and wildlife trafficking and seafood fraud. These efforts will create a more level playing field between foreign and U.S. fishermen and secure the Nation's and fishing communities' significant investments in the safety and sustainability of U.S. domestic fisheries.

HABITAT CONSERVATION AND RESTORATION \$37,875,000

NOAA requests a decrease of \$19,250,000 in program changes for a total of \$37,875,000 in the Habitat Conservation and Restoration activity. Funding will support activities such as the protection of essential fish habitat under the Magnuson-Stevens Act as well as important habitats under the Fish and Wildlife Coordination Act; providing fish passage at hydroelectric dams; protecting deep-sea coral; and maintaining quick response and restoration of habitats impacted by oil spills or other events. NOAA will continue to provide habitat restoration technical expertise (e.g., engineering and design, implementation, monitoring) and leadership to states, Tribes, local communities, and other Federal programs as resources allow.

DISCRETIONARY FUNDS PACIFIC COASTAL SALMON RECOVERY FUND

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in FY 2000 to protect, restore, and conserve Pacific salmon and steelhead and their habitats through competitive funding to states and Tribes. NOAA requests a decrease of \$65,000,000 to eliminate funding for this grant program in FY 2020. The agency will continue its Federal commitment to advancing Pacific salmon and steelhead recovery and tribal treaty fishing rights through other NOAA programs as resources allow.

FISHERIES DISASTER ASSISTANCE FUND

The Fisheries Disaster Assistance Fund provides disaster assistance for addressing the economic and social effects of a commercial fishery failure, for activities to restore the fishery or prevent a similar failure in the future, and for assisting fishing communities. If the Secretary determines that a fishery disaster has occurred, Congress may appropriate funds for disaster assistance, which are administered by the Secretary. The FY 2020 Budget includes \$0 funding for this account. NOAA will work with the states and Tribes with respect to future disaster determinations and shall work with Congress if future funding is necessary for declared disasters. The Administration understands the importance of fishery disaster funds to affected states, Tribes, and communities to help them recover from the disaster and prevent similar fishery failures in the future.

FISHERMEN'S CONTINGENCY FUND

The Fishermen's Contingency Fund allows NOAA to compensate U.S. commercial fishermen for damage or loss of fishing gear, vessels, or revenues caused by oil and gas-related obstructions in any area of the Outer Continental Shelf (OCS). The funds are derived from fees collected annually by the Secretary of the Interior.

FOREIGN FISHING OBSERVER FUND

The Foreign Fishing Observer Fund is financed through fees collected from owners and operators of foreign fishing vessels fishing within the U.S. EEZ. The fund is used by NOAA to pay salaries, administrative costs, data editing and entry costs, and other costs incurred for observers.

FISHERIES FINANCE PROGRAM ACCOUNT

The Fisheries Finance Program is a national loan program that makes long-term, fixed-rate financing available to U.S. citizens who otherwise qualify for financing or refinancing for the reconstruction, reconditioning, or the purchasing of fishing vessels, shoreside processing, aquaculture, mariculture facilities, or individual fishing quota.

MARINE MAMMAL UNUSUAL MORTALITY EVENT FUND

An unusual mortality event is defined under the Marine Mammal Protection Act (MMPA) as "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." This fund supports efforts to examine carcasses and live stranded animals allowing understanding of threats and stressors and the ability to determine when a situation is "unusual."

MANDATORY FUNDS

PROMOTE AND DEVELOP AMERICAN FISHERY PRODUCTS & RESEARCH PERTAINING TO AMERICAN FISHERIES FUND

NOAA will transfer \$158,407,000 from the Promote and Develop account to the NMFS' ORF account. The transfer to ORF will support data collection, data management, and fisheries stock assessment production within the Fisheries Data Collections, Surveys, and Assessments PPA. With this transfer, no funds will be available for the Saltonstall-Kennedy (S-K) program in FY 2020. The Promote and Develop account funds are derived from a transfer of thirty percent of duties on imported fisheries products from the Department of Agriculture (USDA). The Budget also includes a proposal to directly appropriate mandatory funding to DOC, rather than transferring amounts based on customs receipts from USDA. The Administration will formalize these changes through a legislative proposal to be transmitted at a later date. This request is part of a broader reform proposed for USDA's Section 32 program.

FISHERIES FINANCE PROGRAM ACCOUNT

The mandatory component of the Fisheries Finance Program Account authority is subject to the Federal Credit Reform Act of 1990 (FCRA) (2 U.S.C. 661). The FCRA requires estimated loan costs to be appropriated in cash when Congress authorizes annual credit ceilings.

FEDERAL SHIP FINANCING FUND

This account manages the loan guarantee



Baby octopus found on an autonomous reef monitoring structure in American Samoa.

portfolio that existed prior to the enactment of the FCRA.

ENVIRONMENTAL IMPROVEMENT AND RESTORATION FUND

The Environmental Improvement and Restoration Fund was created by the Department of the Interior and Related Agencies Appropriations Act of 1998 for the purpose of carrying out marine research activities in the North Pacific.

LIMITED ACCESS SYSTEM ADMINISTRATION FUND

Under the authority of the MSA Section 304(d)(2)(A), NMFS must collect a fee to recover incremental costs of management, data collection, and enforcement of Limited Access Privilege programs. Fees are deposited into the Limited Access System Administration Fund. Fees shall not exceed three percent of the ex-vessel value of fish harvested under any such program.

WESTERN PACIFIC SUSTAINABLE FISHERIES FUND

Section 204(e) of the 2006 amendments to the MSA authorizes the establishment of the Western Pacific Sustainable Fisheries Fund to allow foreign fishing within the U.S. EEZ in the Western Pacific through a Pacific Insular Area Fishery Agreement.

FISHERIES ASSET FORFEITURE FUND

Section 311(e)(1) of the MSA authorizes the Secretary of Commerce to pay certain enforcement-related expenses from fines, penalties, and forfeiture proceeds received for violations of the MSA, MMPA, National Marine Sanctuaries Act, or any other marine resource law enforced by the Secretary. NOAA has established a Civil Monetary Penalty/Asset Forfeiture Fund.

NORTH PACIFIC OBSERVER FUND

The North Pacific Groundfish Observer Program places all vessels and processors in the groundfish and halibut fisheries off Alaska into one of two observer coverage categories: (1) a full coverage category, and (2) a partial coverage category. In the partial coverage category, landings from all vessels will be assessed a 1.25 percent fee on standard ex-vessel prices of the landed weight of groundfish and halibut. Money generated by this fee will pay for observer coverage in the partial coverage category in the following year.

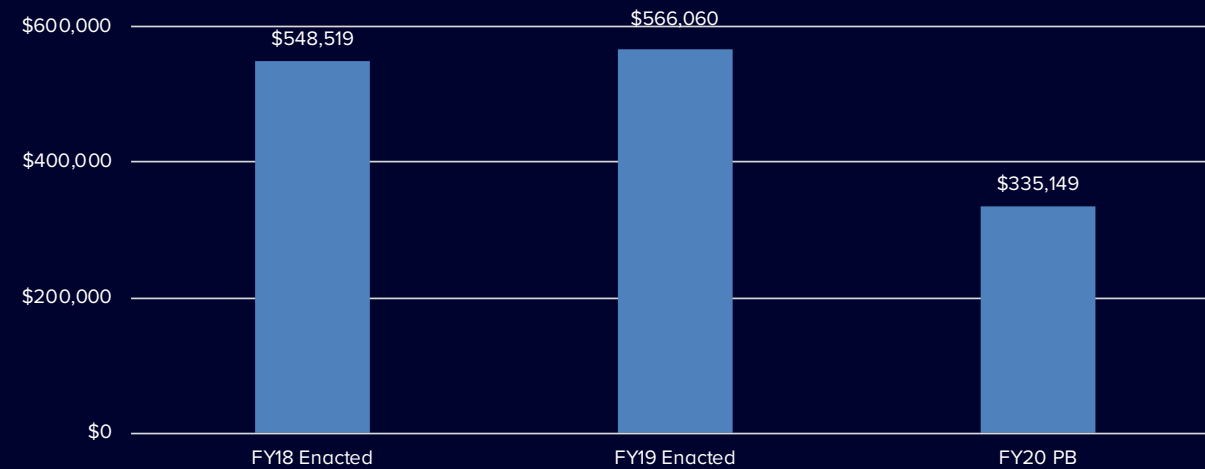


Office of Oceanic and Atmospheric Research

NOAA's Office of Oceanic and Atmospheric Research (OAR) conducts and integrates research across NOAA. OAR's interdisciplinary research promotes better understanding of the Earth, and its scientific results improve NOAA science and services and strengthen decision-making across the country. OAR research improves the accuracy of weather forecasts; enables communities to plan for and respond to short- and long-term weather-related events, such as tornadoes and drought; and enhances the protection and management of the Nation's coastal and ocean resources.

OAR Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

In FY 2018, OAR continued its investments in the foundational research necessary to understand the complex systems that support our planet. Climate Research continued investments and developed partnerships in global ocean and atmosphere observation and monitoring systems. OAR produced research to advance understanding and communication of near-term, regional climate variations that are of societal and economic importance. OAR advances led to improvements in weather forecasting through the transition of weather models to operations; research on severe storms; drought and flood predictions; mid-range outlook weather models; and research on air chemistry, mercury deposition, and atmospheric dispersion of harmful materials. OAR research also advanced coral reef ecosystem science; ocean technology; and services for coastal and Great Lakes communities. The Ocean Exploration and Research Program supported on-going efforts to explore the world's oceans, leveraging partnerships with federal agencies, nonprofit organizations, and academic institutions to support new exploration missions in the Gulf of Mexico, expand access to exploration through telepresence technology, and increase capacity

and development of deep water AUVs. NOAA Research highlights include:

NOAA scientists discovered new emissions of ozone-depleting CFC-11, and the Parties to the Montreal Protocol responded by mandating an investigation into the potential sources and encouraging Parties to strengthen monitoring. The Parties also considered fundamental changes to the Montreal Protocol itself to minimize noncompliance in the future. NOAA's Global Monitoring Laboratory has added targeted halocarbon monitoring to an existing observatory on the west coast of South Korea, the region where emissions were found to be increasing.

The FV3, a weather model developed by OAR's Geophysical Fluid Dynamics Laboratory, was chosen as the new engine to run the Next Generation Global Prediction System (NGGPS), which will become the next operational weather modeling system. OAR and the National Weather Service continued to work on operational implementation of FV3 in 2018 and full operational deployment for forecasting is expected in 2019.

NOAA collected and archived over 3.3 million square kilometers (967,810 square nautical

miles) of bathymetric data—an area roughly equivalent to combined land areas of Alaska, California, Texas, Montana and Kentucky—and have characterized the deep sea habitats through the visual inspection and collection of associated geological and biological samples.

FY 2019

In FY 2019, OAR is expanding resources for weather, air chemistry, ocean, coastal, and Great Lakes research, and sustaining funding for climate activities and collaborative partnerships in high performance computing. OAR is also continuing to improve weather forecasts, technology for weather operations, and science to explore and manage our oceans. NOAA Research highlights include:

The interagency Fourth National Climate Assessment (NCA4) was released in November 2018. Volume II of NCA4 reflects the latest understanding of how changes in the physical climate translate into socioeconomic impacts on regional scales. It describes how climate change may increase risks to fisheries in the Northwest, impact water resources in the Southwest, affect coastal infrastructure in the Southeast, threaten the Northeast's urban corridor, and impact agricultural communities throughout the central states. NOAA is one of 13 federal agencies that contributed significantly to the NCA4.

Based on Congressional mandates in the National Integrated Drought Information System Reauthorization Act of 2018, NOAA is establishing the Earth Prediction Innovation Center (EPIC) for advancing weather modeling skill and international leadership in the area of numerical weather prediction. NOAA is creating a community global weather research modeling system that is accessible by the public and utilizes innovative strategies to host and manage the system, which is designed to meet NOAA's operational forecast mission to protect life and property and



NOAA scientists prepare to launch a balloon that will monitor the thickness of the ozone layer and vertical distribution at the South Pole.

improve economic growth.

The Ocean Acidification Program is continuing the development of ocean monitoring and modeling capabilities, and vulnerability assessments to support research on innovative methods to mitigate and adapt to ocean acidification. Ocean observations led to assessments of ocean acidification impacts to coral reefs and fisheries and to sea level change risks that improved coastal community preparedness.

OAR is expanding efforts to explore the world's oceans, increasing capacity and development of deep water AUVs, leveraging partnerships and external awards, expanding exploration workshops, and supporting new exploration missions. Telepresence technology for ocean exploration will be used to map mineral deposits and sites of submerged human history, and to continue making open-source data available in real-time to the oceanographic community and private industries.

FY 2020 REQUEST \$335,149,000

In FY 2020, NOAA requests a total of \$335,149,000 to support OAR's continued and sustained operations. This total includes Operations, Research, and Facilities (ORF) and Procurement, Acquisition, and Construction (PAC) accounts and includes

a net decrease of \$236,597,000 in FY 2020 program changes.

The FY 2020 request will allow OAR to provide robust science that is instrumental to saving lives and property, managing natural resources, and maintaining a strong economy. With this funding, OAR research will continue to advance NOAA science and services by providing better forecasts and improving understanding of the Earth and its processes.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Subactivity is located in Appendix 3. Detailed descriptions of the program changes below are located in the NOAA FY 2020 Congressional Justification

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$309,149,000 to support the Operations, Research, and Facilities

activities of OAR, reflecting a net decrease of \$221,597,000 in FY 2020 program changes.

CLIMATE RESEARCH \$87,509,000

NOAA requests a decrease of \$66,991,000 in program changes for a total of \$87,509,000 in the Climate Research activity. This total provides the long-term observing, monitoring, research, and modeling capabilities performed in OAR's Climate Research. It provides the science that Americans need to understand how, where, and when Earth's conditions are changing.

WEATHER & AIR CHEMISTRY RESEARCH \$110,565,000

NOAA requests a net decrease of \$34,111,000 in program changes for a total of \$110,565,000 in the Weather and Air Chemistry Research activity. This total supports NOAA's efforts to advance community-developed enhancements to the last weather models and to provide the resources needed to advance and accelerate transition of the most promising research



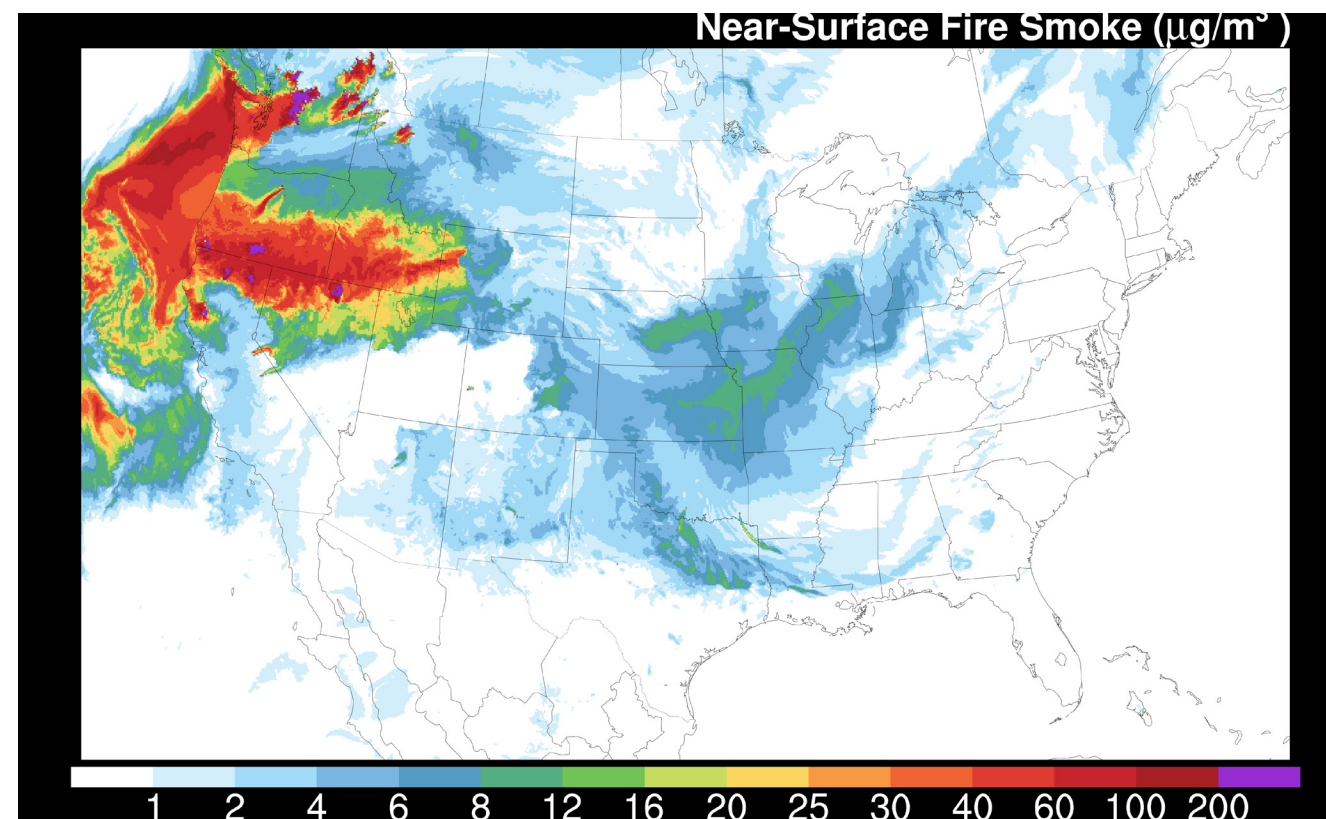
A local fisherman sorts through a catch of clustered wild oysters. In 2016, Georgia Sea Grant and the University of Georgia Marine Extension opened the state's first oyster hatchery, bringing the popular shellfish back to the forefront on the Georgia coast after more than 50 years and diversifying the state's aquaculture industry.

activities into National Weather Service. Program changes include:

U.S. Weather Research Program: Earth Prediction Innovation Center: NOAA requests an increase of \$12,320,000 to accelerate community-developed scientific and technological enhancements into operational applications for numerical weather prediction (NWP). This virtual center will serve as the core research-to-operations-to-research (R2O2R) hub for building and maintaining a community modeling framework to 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 NWP 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.

OCEAN, COASTAL & GREAT LAKES RESEARCH \$98,840,000

NOAA requests a net decrease of \$120,495,000 in program changes for a total of \$98,840,000 in the Ocean, Coastal, and Great Lakes Research activity. This total includes research activities to better understand our oceans and Great Lakes natural resources and the influence they have on the Earth's weather and climate through technological



An example prediction of near-surface smoke from the experimental High-Resolution Rapid Refresh - Smoke (HRRR-Smoke) model that has been used by NWS forecast offices across the U.S. to support air quality and visibility forecasts used in decision-making by emergency services offices, the National Park Service, and transportation companies.

advancements in modeling, computing, observing, and information dissemination. Program changes include:

National Oceanographic Partnership Program: NOAA requests an increase of \$5,000,000 to strengthen NOAA's support for the interagency National Oceanographic Partnership Program (NOPP) by establishing a stable dedicated funding source that can be used to leverage other NOAA programs to use this extramural, competitively-awarded partnership-based research program.. Previous NOPP successes include creation of a comprehensive national ocean observing network, air/ocean modeling improvements and transitions, and innovative marine technology solutions.

INNOVATIVE RESEARCH & TECHNOLOGY \$12,235,000

NOAA requests a total of \$12,235,000 in the Innovative Research & Technology activity. This total provides continued support to accelerate the adoption and transition of advanced computing and technology throughout NOAA.

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$26,000,000 to support the Procurement, Acquisition, and Construction activities for OAR, reflecting a decrease of \$15,000,000 in FY 2020 program changes.

SYSTEMS ACQUISITION \$26,000,000

NOAA requests a decrease of \$15,000,000 in program changes for a total of \$26,000,000 in the Systems Acquisition activity. The proposed decrease will terminate the computing partnership with Mississippi State University. This total provides the computational resources to support advances in environmental modeling crucial for understanding critical Earth system modeling issues.



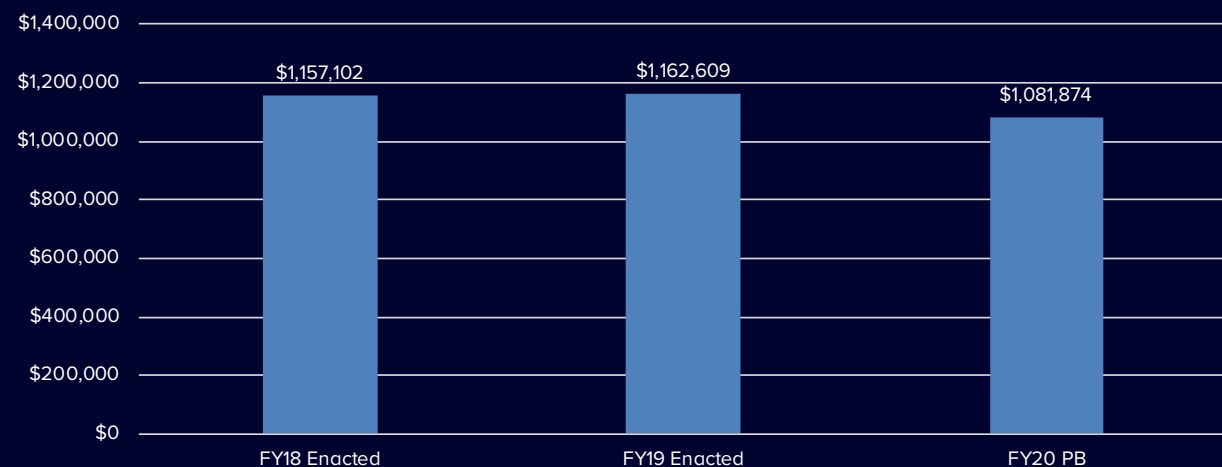
National Weather Service

NOAA's National Weather Service (NWS) is the official government authority for issuing warnings during life-threatening weather events. Every day, NWS forecasters issue public, aviation, marine, fire weather, climate, space weather, river, and flood forecasts and warnings for the protection of life, property, and the enhancement of the national economy. NWS forecasters work with local partners and communities to understand and manage risk, formulate emergency response plans, and promote community preparedness and public safety. Each year, NWS collects approximately 76 billion observations and issues approximately 1.5 million forecasts and 50,000 warnings. NWS data and products are publicly available through a national information infrastructure used by the public, governmental agencies, the private sector, and the global community.

The new NWS Radar in San Juan, Puerto Rico is raised into position, replacing the previous system destroyed by Hurricane Maria in 2017.

NWS Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

NWS continued its investments to make the United States a Weather-Ready Nation (WRN) to help the public prepare for, and respond to extreme weather events. Advancements in quality, consistency, and effectiveness across all portfolios are driven by the goal of building WRN. NWS was also charged with improving weather forecasting through new sources of data and research to meet requirements within the Weather Research and Forecasting Innovation Act of 2017. NWS continued providing exemplary forecasts for hurricanes, floods, storms, and droughts. Through the 2018 historic hurricane season, NWS provided accurate track, storm surge, and rainfall forecasts, coupled with proactive decision support services, allowing emergency managers and the public to take life-saving measures. Additional 2018 highlights include:

In the midst of the devastating California wildfires, NWS personnel were deployed to the California State Emergency Operations Center for approximately 45 days, and provided around-the-clock support from July until December 2018. This close Impact-Based Decision Support Services (IDSS) provided immediate, detailed weather information for the emergency management community and other

government core partners that led to critical decisions to fight the fires, moving people out of harm's way, and save lives.

The Global Forecast System with the new FV3 core (FV3GFS) was publicly released on March 30, 2018, before it became operational, allowing the broader weather community to use it for modeling and development. Early testing shows improvements over current models in the prediction of large scale weather events, the timing and amount of rainfall, and prediction of tropical cyclone track and intensity for up to five days.

NWS installed radiosonde autolaunchers at four sites in the Alaska Region: Fairbanks, Yakutat, Annette, and St. Paul Island, increasing the availability of radiosonde data in Alaska by 14 percent. Autolaunchers allow automated technology to collect upper air observations for the Nation's weather balloon network, a critical observing system contributing to the accuracy of global weather and regional hurricane models. Alaska is the focus of the initial U.S. autolauncher installations because harsh conditions and vast distances between sites make manual radiosonde releases particularly difficult, costly and time-consuming.

NWS completed the migration of all NWS sites to a consolidated network dubbed "OneNWSNet" and increased bandwidth to all local offices, increasing network reliability and improving forecasters' ability to produce timely and accurate forecasts and share them with their partners. These upgrades support aviation safety, transmittal of weather data to the supercomputer modeling sites, dissemination of weather products to the public, and issuance of severe weather warnings for their areas.

FY 2019

NWS will implement the first phase of the Next Generation Global Prediction System (NGGPS) when the FV3-based Global Forecast System becomes operational. The NWS will also upgrade the National Water Model (NWM) and will continue to implement the results from the Operations and Workforce Analysis. The NWM in particular provided accurate flood forecast information for the catastrophic flood levels experienced in North Carolina during Hurricane Florence. NWS forecasts of record precipitation fed extremely accurate river flood level forecasts and duration, which helped emergency managers and responders plan for and respond to the flooding. NWS will continue efforts with the Advanced Weather Interactive Processing Systems to simplify and enhance the software and begin to reduce the systems hardware footprint. NWS will also continue to implement the Service Life Extension Program (SLEP) for the Next Generation Weather Radar (NEXRAD) and the Automated Surface Observing System (ASOS). Additional 2019 highlights include:

Completing the implementation of the FV3 dynamic core into NOAA's operational models. NOAA publicly released the Global Forecast System with the new FV3 core (FV3GFS) in FY 2018, before it became operational. This enabled its use by the broader community for modeling and further development, supporting weather forecasting improvement as called for in the Weather Act.



A double-rainbow is visible in the skies above the NWS Sterling Field Support Center office after a series of thunderstorms passed over the DC region.

NOAA's Integrated Dissemination Program (IDP) will reach Full Operating Capability in 2019. IDP is a multi-year NWS response to organizational and technical dissemination challenges across the NWS enterprise. These weaknesses resulted in near-national impacts during severe weather events. IDP sustains continuous mission operations in support of the Department of Commerce 2018-2022 Strategic Plan, Strategic Objective 3.3 Reduce Extreme Weather Impacts.

The release of version 2.0 of the National Water Model (NWM) which includes Hawaii for the first time. The NWM improves NOAA's ability to provide more frequent, accurate, and expanded water information used to save lives and protect property.

Beginning relocation of the Weather Forecast Office (WFO)/ River Forecast Center (RFC) and NEXRAD in Slidell, LA from a flood-prone location. This is the most pressing major construction need of NWS. This one-time relocation project will be completed in FY 2023.

FY 2020 REQUEST \$1,081,874,000

In FY 2020, NOAA requests a total of \$1,081,874,000 to focus on NWS's core mission, which is to provide weather, water, and climate forecasts and warnings that protect lives and property. NWS will continue to pursue its Weather-Ready Nation goals, including activities to improve forecast accuracy and consistency and enhance forecast

collaboration with core partners. This total includes Operations, Research, and Facilities (ORF) and Procurement, Acquisition, and Construction (PAC) accounts and includes a net decrease of \$101,662,000 in program changes.

NWS's FY 2020 request prioritizes NWS's core functions. NWS will continue to provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Subactivity is located in Appendix 3. Detailed descriptions of the program changes below are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$989,298,000 to support the Operations, Research, and Facilities activities of the NWS, reflecting a net decrease of \$77,348,000 in program changes.

OBSERVATIONS \$211,699,000

NOAA requests a net decrease of \$17,022,000 in program changes for a total of \$211,699,000 in the Observations activity. Program change increases include:

NOAA Ship Observation Data Buy: NOAA requests an increase of \$2,200,000 to improve tropical and marine watches and warnings, as well as global weather models, by initiating a data buy contract for meteorological and oceanographic observations from ships. Ship-based observations constitute one of the most cost-effective opportunities to increase skill of the global prediction system. This initiative has the potential to increase data availability from ships by orders of magnitude, filling significant data gaps used to support maritime commerce and warnings of extreme events.



First test of the radiosonde released from an autolauncher on April 11, 2018 in Fairbanks, AK.

CENTRAL PROCESSING \$86,864,000

NOAA requests a net decrease of \$12,229,000 in program changes for a total of \$86,864,000 in the Central Processing activity. Program change increases include:

Improve System Support Capabilities: NOAA requests an increase of \$704,000 for systems administration support contractors at the National Centers for Environmental Prediction (NCEP) Central Operations to enable appropriate timeliness of response and resolution of system issues that impact forecasters in the National Centers. To continue meeting the Central Processing (CP) Program's operational requirements, NWS requires this funding to maintain current level of services and ongoing operations necessary to issue warnings and forecasts to protect life and property.

ANALYZE, FORECAST, AND SUPPORT \$483,036,000

NOAA requests a net decrease of \$35,185,000 in program changes for a total of \$483,036,000 in the Analyze, Forecast, and Support activity. Program change increases include:

Support Impact-based Decision Support Services and IT Security: NOAA requests an increase of \$4,860,000 to support Impact-based Decision Support Services and IT Security within the NWS. This request will

support core IDSS training which includes courses that improve professional competencies which range from base training in risk communications to specialized training for incident meteorologists. Included in the request is support travel for Warning Coordination Meteorologists and other IDSS-qualified staff to work directly with emergency managers prior to and during high-impact events. Both requests directly support Section 4 of the Weather Act.

Funding will also be used to refresh IT equipment used by forecasters and field managers in the provision of forecasts and warnings. The funds will be used to laptops and tablets, which are used by forecasters both in field offices and those deployed to emergency operations centers, dispatches to front line fire camps and to support post-storm damage surveys.

DISSEMINATION \$75,093,000

NOAA requests a net decrease of \$389,000 in program changes for a total of \$75,093,000 in the Dissemination activity. Program change increases include:

Support Operations and Maintenance of Integrated Dissemination Program System:

NOAA requests an increase of \$223,000 for a systems administration support contractor at the NCEP Coordination Office (NCO) to support the operations and maintenance of the IDP system, the new applications being onboarded to IDP, and enhancements to the applications currently running on the system. To continue meeting the Dissemination Program's operational requirements, NWS requires this funding to maintain current level of services and ongoing operations necessary to issue warnings and forecasts to protect life and property.

SCIENCE AND TECHNOLOGY INTEGRATION \$132,606,000

NOAA requests a net decrease of \$12,523,000 in program changes for a total of \$132,606,000 in the Science and Technology Integration activity. Program change increases include:

Collaborative Science, Technology, and Applied Research Contracts: NOAA requests an increase of \$1,293,000 to restore grants



A supercell thunderstorm moves across the Kansas landscape at sunset.

for the Collaborative Science, Technology, and Applied Research (CSTAR) program and provide contracts for IT support at the NCEP Environmental Modeling Center. To continue meeting the Science, and Technology Integration (STI) Program's operational requirements, NWS requires this funding to maintain current level of services and ongoing operations necessary to issue warnings and forecasts to protect life and property.

Establish National Weather Service Pilots:

NOAA requests an increase of \$2,000,000 to test and make improvements to the National Blend of Models (NBM) which is foundational to the Collaborative Forecast Process (CFP). In FY 2020 NWS will focus on the NBM as a primary science and technology tool that will enable the CFP by allowing forecasters the ability to have a scientifically valid common starting point for forecasts. A common starting point will improve national forecast consistency, and improve NWS customers' confidence in the forecast. Early testing of the NBM as a common starting point suggests that there may be efficiencies in the forecast process that could be used to improve IDSS to NWS partners.

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$92,576,000 to support the Procurement, Acquisition, and Construction activities of the NWS, reflecting a net decrease of \$24,314,000 in program changes.

SYSTEMS ACQUISITION \$83,942,000

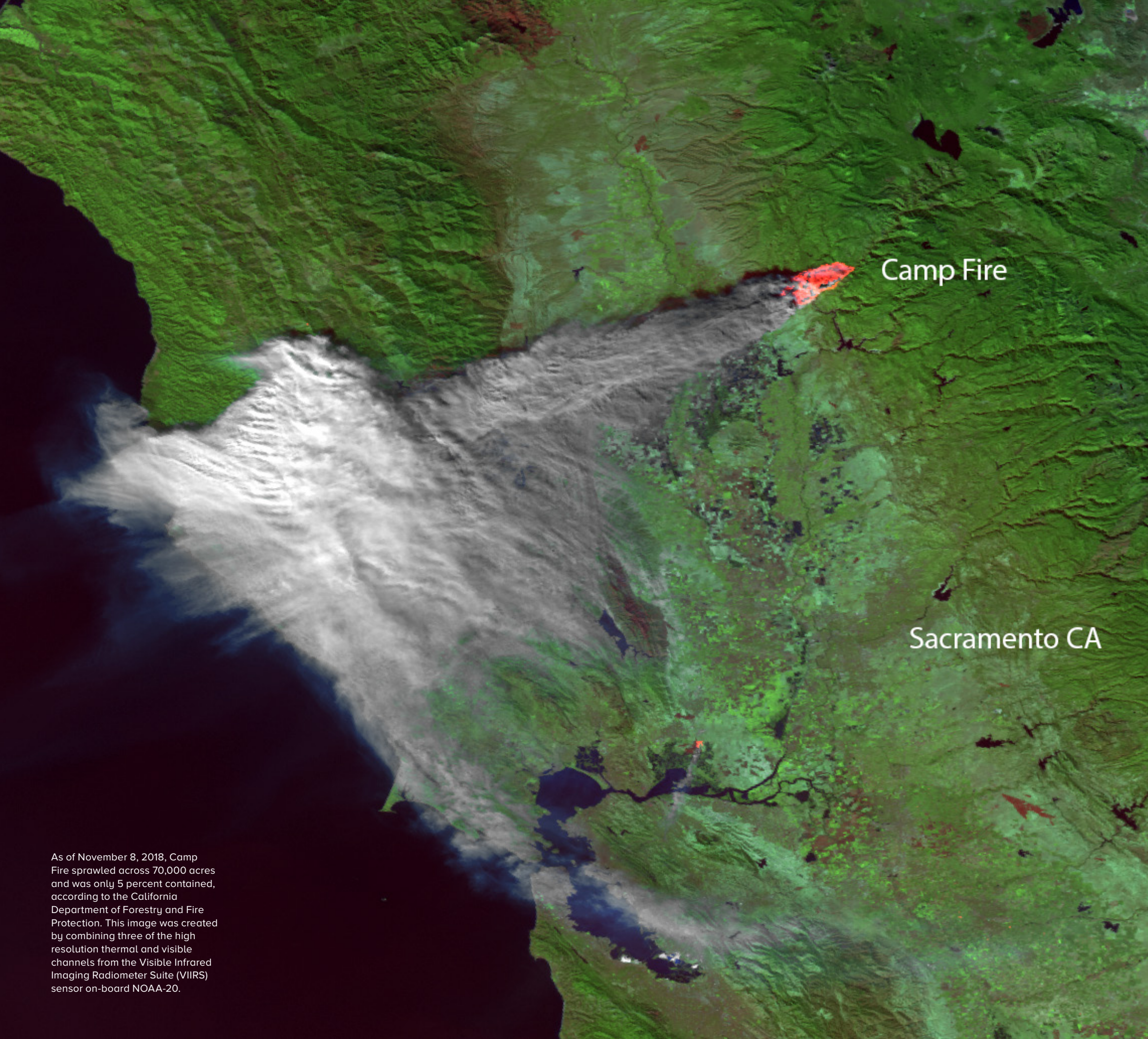
NOAA requests a decrease of \$13,948,000 in program changes for a total of \$83,942,000 in the Systems Acquisition activity. This total provides continued support for the Nation's weather radar and surface weather observing network, ensures the uninterrupted flow of information from the collection of observations, to central guidance production, to local applications of all essential weather and climate data products, and continuity of public watches and warnings, and development of a reliable and scalable NWS dissemination infrastructure to sustain 24x7 mission operations.

CONSTRUCTION \$8,634,000

NOAA requests a decrease of \$10,366,000 in program changes for a total of \$8,634,000 in the Construction Activity. This total supports repairs and renewal of forecast offices and other government owned weather facilities that contain critical infrastructure; maintain structural integrity through capital improvements.



Winds pile up broken ice on the shores of Lake Erie during a cold wave in February 2018.



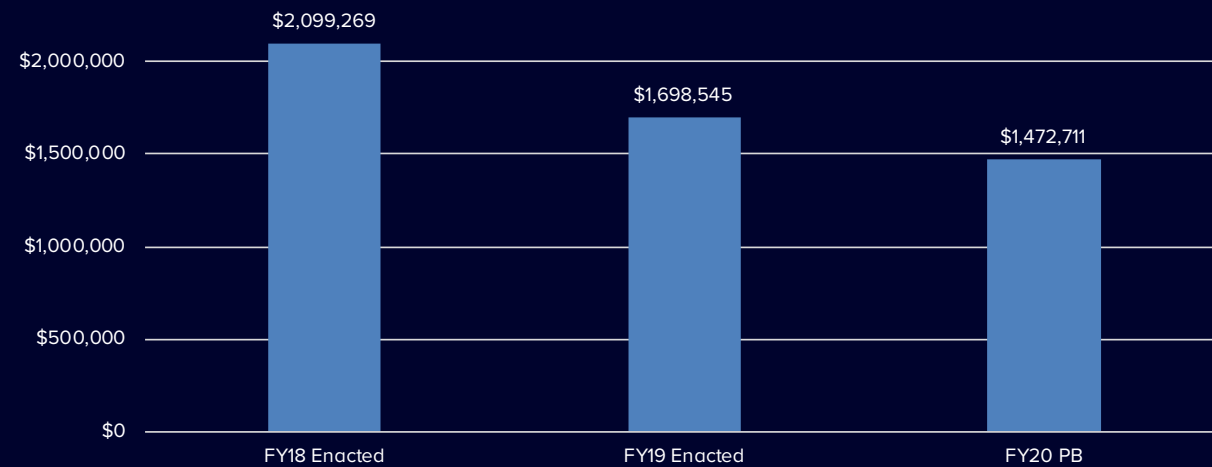
National Environmental Satellite, Data and Information Service

The National Environmental Satellite, Data, and Information Service (NESDIS) provides timely access to global environmental space based and ground-based data that promote, protect, and enhance the Nation's economy, national security, environment, and quality of life. Along with launching and operating NOAA's satellites, NESDIS manages the product development and distribution of NOAA and partner satellite data, archives this and other environmental data and provides numerous environmental and resource reports for commercial, state, regional, national and global users. NOAA satellites support the national weather and space weather forecasting enterprise by providing timely, high quality data for model outputs and publicly disseminated weather forecasts. NESDIS also works to develop the next generation of satellites to avoid gaps in satellite coverage that could affect NOAA's primary mission essential functions.

As of November 8, 2018, Camp Fire sprawled across 70,000 acres and was only 5 percent contained, according to the California Department of Forestry and Fire Protection. This image was created by combining three of the high resolution thermal and visible channels from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor on-board NOAA-20.

NESDIS Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

In FY 2018, NESDIS continued its investment in technological advances to its satellite programs which provided improved data for weather forecasting and environmental monitoring. The Geostationary Operational Environmental Satellite-17 (GOES-17) became the second in the GOES-R Series to be launched into orbit. NOAA-20, previously known as Joint Polar Satellite System-1 (JPSS-1), became an operational satellite, complementing and providing operational continuity to the NOAA/National Aeronautics and Space Administration (NASA) Suomi National Polar-orbiting Partnership (Suomi NPP) as a low-earth polar orbiting satellite. These satellites, in addition to those already in orbit, were critical to providing continuity of data and imagery during extreme weather events, ranging from wildfires in California to hurricanes in the Southeastern United States. NOAA also completed a study of the NOAA Satellite Observing System Architecture (NSOSA), which was used to inform future architecture decisions. Additional 2018 highlights include:

The first time the GOES East satellite (formerly known as GOES-R and GOES-16) was able to see the entire Atlantic basin from its operational location of 75.2 degrees west longitude. Advanced imagery from GOES East tracked

storms as they formed off the coast of Africa and then entered the Atlantic. This early tracking was critical for following major storms like Hurricanes Florence and Michael which devastated the U.S. Eastern seaboard.

NESDIS' GOES East satellite used its Geostationary Lightning Mapper (GLM), the first lightning detector in a geostationary orbit, captured its first images from space. The GLM continuously looks for lightning flashes in the Western Hemisphere, so forecasters know when a storm is forming, intensifying and becoming more dangerous. GLM data will help forecasters anticipate severe weather and issue flood and flash flood warnings sooner.

By merging data from NOAA's GOES-East and Suomi NPP satellites, NOAA was able to provide the wildfire fighting community with improved products to support tracking and containing deadly wildfires that spread through California throughout 2018. Hot, dry weather accompanied by windy conditions sparked several wildfires, including the destructive Camp Fire in Northern California and the Woolsey Fire in Southern California.

In the midst of these fires, emergency responders were able to utilize a combination

of NOAA's powerful new satellite sensors and weather models to provide accurate forecasts of smoke movement. The mountainous terrain out west is complex and wildfire behavior can be erratic, but by combining satellite-based wildfire detection capabilities with a high-resolution atmospheric model, accurate forecasts about the movement of smoke are now possible. Smoke in urban areas causes coded air quality days that affect human health and general visibility, and accurate forecasts enabled transportation managers to adjust train and airline schedules to avoid the worst smoke hazards.

The imager on Suomi NPP Satellite, the Visible Infrared Imaging Radiometer Suite (VIIRS), captured detailed thermal imagery of the eruption of Kilauea, one of Hawaii's most active volcanoes that has been actively erupting since 1983. Suomi NPP satellite's VIIRS sensor produced imagery of the eruption by combining three high resolution thermal and visible channels that help distinguish different land types and features based on their visual and thermal differences.

NESDIS awarded a contract to Thales USA, Inc. for the design, build, installation and checkout of a Medium Earth Orbiting Local User Terminal (MEOLUT) ground station in New Mexico. The contract will result in the March 2020 delivery of a MEOLUT ground system capable of receiving distress signals from over 20 Medium Earth Orbiting Search



On December 13, 2017, only twenty-five days after JPSS-1 (NOAA-20) launched, it sent back this image which captures the Thomas Fires in Southern California.

and Rescue (MEOSAR) Satellites, continuing the transition to the new and far more capable search and rescue services to support NOAA's comprehensive weather and environmental forecasting mission.

FY 2019

In FY 2019, NESDIS continues its development and acquisition of its geostationary, polar-orbiting, and Deep Space satellites. NESDIS will continue to provide support to its on-orbit satellites to ensure continued quality assurance of products and services delivered to the National Weather Service and the national weather enterprise. NESDIS will continue to design a modern architecture by broadly examining instruments, services, platforms, and orbits, driven by user needs, new technology, and exploiting emerging space business models as outlined in NSOSA. NESDIS will continue to archive and provide access to data from the National Centers for Environmental Prediction. Additional 2019 highlights include or will include:

GOES-17 (formerly known as GOES-S) became operational in February 2019 as GOES-West. GOES-West collects three times more data at four times better resolution, and scans the Earth five times faster than previous legacy geostationary satellites over western North America, it will provide far more information to the models used to make five-day forecasts. The high resolution observations are already leading to significant improvements in forecasts in the Alaska region.

Also in February, NOAA-20 (formerly known as JPSS-1) was designated as NOAA's primary afternoon polar satellite. NOAA-20 features the most advanced technology NOAA has ever flown in a polar orbit to capture more precise observations of the world's atmosphere, land and waters. Suomi-NPP, which was the prior primary afternoon polar satellite, flies in nearly the same orbit as NOAA-20 but 50 minutes behind, and will continue to

provide observations, allowing the U.S. to benefit from two sophisticated spacecraft in our polar-orbit constellation.

Development of an Earth-Sun Lagrange 1 (L1) mission will continue with the Space Weather Follow On (SWFO) program. SWFO will continue developing compact coronagraph and Solar Wind Instrument Suite (SWIS) instruments. The FY 2019 funding allows NOAA to develop SWFO to meet the integration timeline for a rideshare with NASA's research mission to the same deep space location.

NESDIS will continue to support launch of the Argos Advanced Data Collection System (Argos A-DCS) instrument as a hosted payload with US Air Force (USAF) support on a reimbursable basis to low Earth orbit on a commercial spacecraft by late 2021.

The COSMIC program provides NOAA the opportunity to continue its joint collaboration with Taiwan, National Science Foundation, NASA, USAF, and University Corporation for

Atmospheric Research (UCAR). NESDIS will continue to support the launch of COSMIC-2, scheduled for no later than May 31, 2019, by operating a ground system consisting of a global network of ground reception stations and a Radio Occultation (RO) data processing center.

NESDIS partnered with European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to provide instruments for Metop-C, a new polar-orbiting satellite, launched on November 6, 2018. Metop-C collects valuable data about Earth's atmosphere, land and oceans that is critical for NOAA's weather models.

The Commercial Weather Data Pilot (CWDP) will build on the Round 1 purchase and evaluation of RO data by assessing the data received by the commercial sector during the Round 2 (contract awarded Sept. 2018). RO data are considered a proven and cost-effective means of increasing the volume of quality global atmospheric soundings. RO data provides temperature, water vapor, and pressure profiles

to compliment the microwave and infrared soundings provided by NOAA's JPSS and EUMETSAT's Metop satellites, which results in more accurate weather forecasts.

FY 2020 REQUEST \$1,472,711,000

NOAA requests a total of \$1,472,711,000 to support the continued and enhanced operations of NESDIS through its Operations, Research, and Facilities (ORF) and Procurement, Acquisition, and Construction (PAC) accounts. This includes decreases totaling \$236,166,000 and increases totaling \$17,268,000, for an overall net decrease of \$218,898,000 in FY 2020.

The FY 2020 request includes continued support for development of NOAA's polar-orbiting and geostationary satellite programs; Space Weather Follow On; support for satellite operations, and increased support for commercial data buy of Global Navigation Satellite System (GNSS) Radio Occultation (RO) data, and requests new initiatives Joint Venture Partnerships and Geostationary and Extended Orbits (GEO-XO).

In FY 2020, NOAA is proposing to restructure NESDIS' budget, and realign the organization, to position itself as the world leader in earth observations and modeling, and expand commercial space activity. The current NESDIS budget and organizational structure has enabled NESDIS to develop and exploit successfully individual NESDIS-owned and operated satellite missions. The proposed structure will increase flexibility to leverage partner satellites and observations, to integrate technology and innovations, and to manage risks across the observing system. The proposed budget structure and architecture—a combination of NOAA-owned and managed assets, partner assets, commercial partnerships, and the purchase of data will leverage new public and private sector science and technical innovation, be agile and responsive to public and private users' needs

and expectations, and avoid suboptimal risk management and a higher cost future architecture with lower performance. By making small adjustments to a limited set of budgetary features, NESDIS will be able to more easily partner with the commercial sector and with research observing system assets, take advantage of cost-saving, and forecast improving technologies, all while maintaining cost and schedule transparency.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Subactivity is located in Appendix 3. Detailed descriptions of the program changes below are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

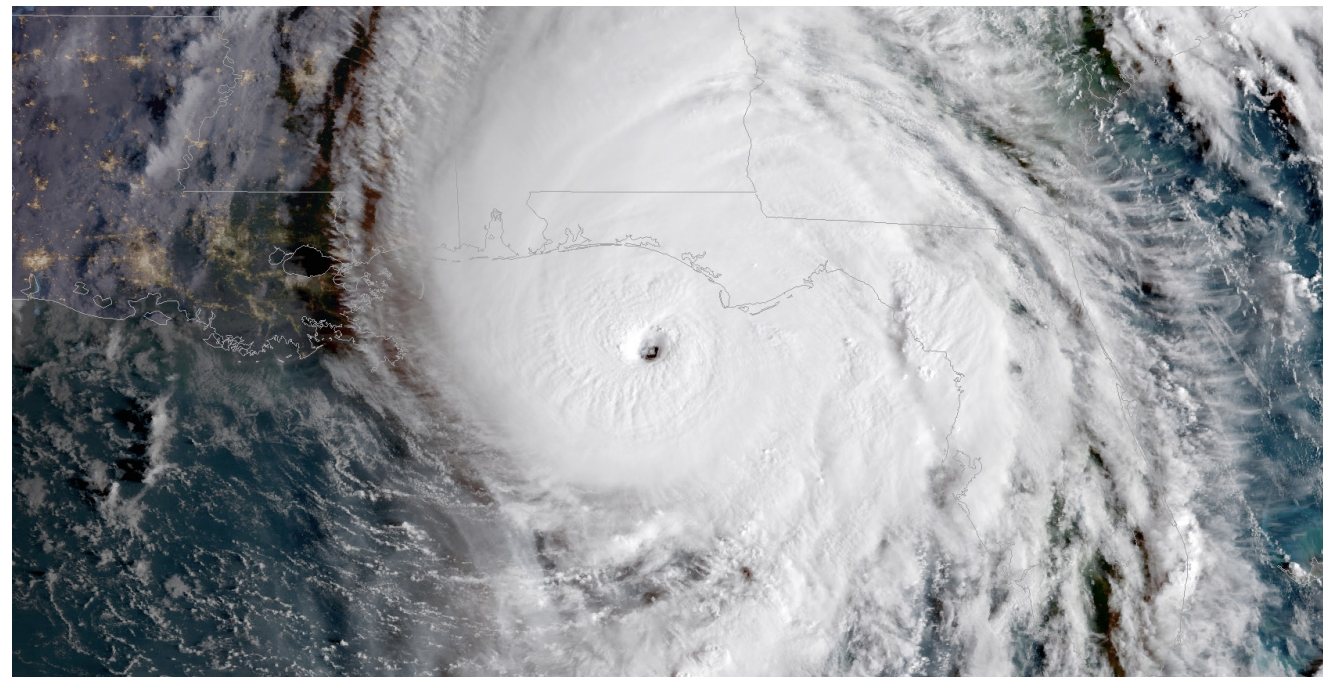
NOAA requests a total of \$271,592,000 to support the Operations, Research, and Facilities activities of NESDIS, reflecting a decrease of \$8,563,000 in FY 2020 program changes.

ENVIRONMENTAL SATELLITE OBSERVING SYSTEMS \$215,022,000

NOAA requests a net decrease of \$3,920,000 for a total of \$215,022,000 in the Environmental Satellite Observing Systems activity. This total provides continued support for satellite operations and the development of new products to leverage global observing system capabilities for Weather Act objectives.

NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION \$56,570,000

NOAA requests a decrease of \$4,643,000 for a total of \$56,570,000 in the National Centers for Environmental Information activity. This total provides continued support for aligning science and stewardship requirements and resources to ensure return on investments on NOAA observation systems.



This GOES East satellite image shows Hurricane Michael, a then Category 4 hurricane, on Wednesday, Oct. 10, 2018 as it barreled toward the Florida Panhandle. Less than 90 miles southwest of Panama City, Florida, Hurricane Michael brought life-threatening storm surge, hurricane-force winds and heavy rainfall. This geocolor-enhanced imagery was created by NOAA's partners at the Cooperative Institute for Research in the Atmosphere (CIARA).

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$1,201,119,000 to support the Procurement, Acquisition, and Construction activities of NESDIS, reflecting a net decrease of \$210,335,000 in FY 2020 program changes.

SYSTEMS ACQUISITION \$1,199,971,000

NOAA requests a net decrease of \$210,335,000 for a total of \$1,199,971,000 in the Systems Acquisition activity. This total provides continued support for the development, deployment, and sustainment of flight and ground assets that meet the nation's needs for observations and measurements, and to lead and manage the NESDIS system architecture, enterprise engineering, and advanced planning efforts to deliver sustainable, robust, and adaptive systems and services that meet NESDIS customer needs. It includes \$25,600,000 for the Space Weather Follow-On (SWFO) program, and \$14,850,000 for the Cooperative Data and Rescue Services (CDARS) program. Program changes also include:

Systems Architecture and Engineering:

Joint Venture Partnership: NOAA requests an increase of \$2,268,000 to develop and demonstrate evolving capabilities for NOAA's operational use by leveraging and partnering with NASA's Earth Science and Heliophysics programs.

(DOLLARS IN THOUSANDS)	Joint Venture (SAE)	Total SAE Request
FY 2020 Request	\$2,268	\$44,822
FY 2021	TBD	TBD
FY 2022	TBD	TBD
FY 2023	TBD	TBD
FY 2024	TBD	TBD

Systems Architecture and Engineering: Geostationary and Extended Orbits (GEO-XO):

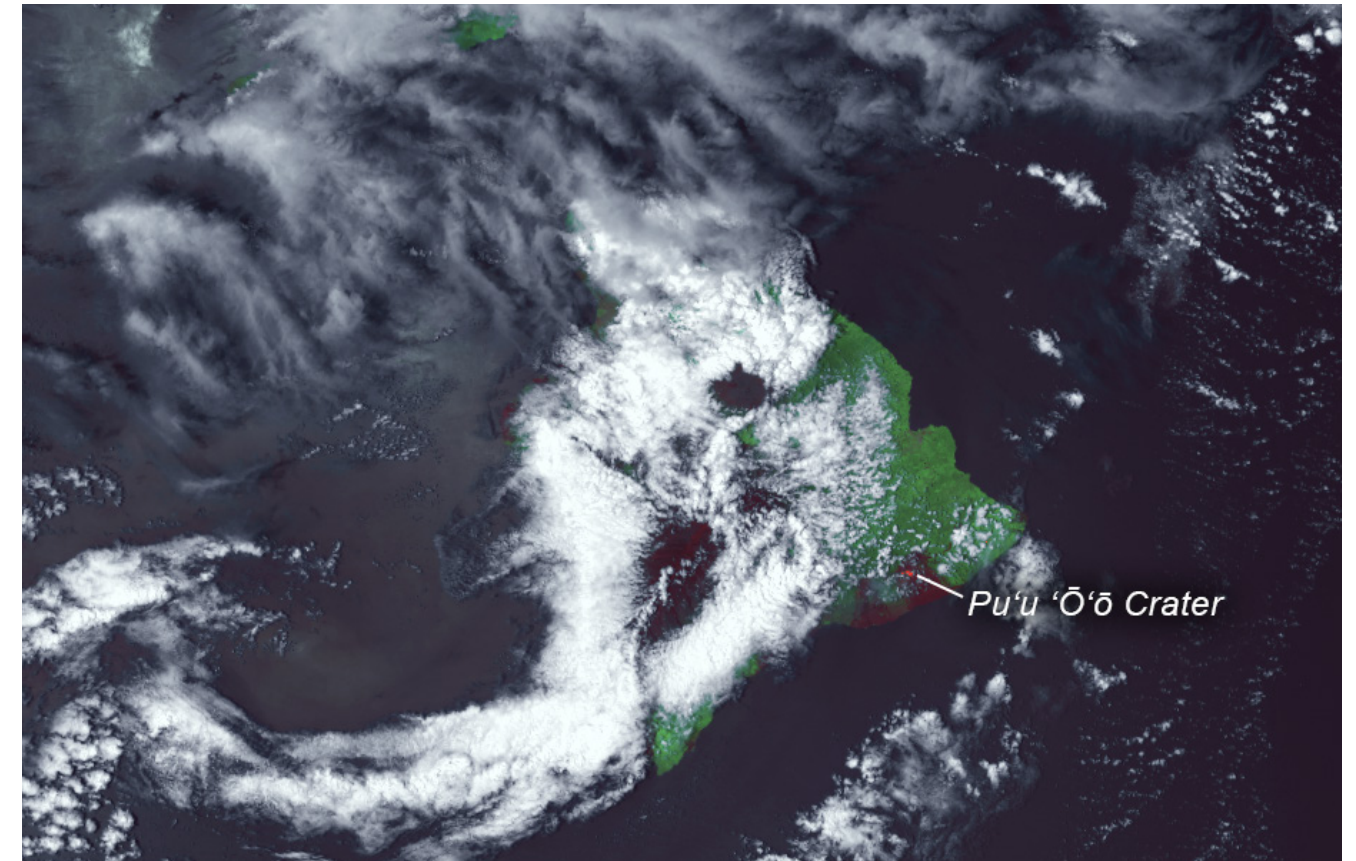
NOAA requests an increase of \$10,000,000 to conduct a series of industry studies, analyses, and potential flight or hardware demonstrations to optimize ways to meet NOAA's future requirements from a geostationary orbit, informed by results of NOAA's Satellite Observing System Architecture (NSOSA) study.

(DOLLARS IN THOUSANDS)	GEO-XO (SAE)	Total SAE Request
FY 2020 Request	\$10,000	\$44,822
FY 2021	TBD	TBD
FY 2022	TBD	TBD
FY 2023	TBD	TBD
FY 2024	TBD	TBD

Systems Architecture and Engineering:

Commercial Data Purchase: NOAA requests an increase of \$5,000,000 to take the next step in our activities with the commercial sector to initiate purchasing commercial Global Navigation Satellite System (GNSS) Radio Occultation (RO) data for operational use. This request will also support continued development of the infrastructure and capability to securely import, transfer, process, and store external data from commercial partners for operational use.

(DOLLARS IN THOUSANDS)	Commercial Data Purchase (SAE)	Total SAE Request
FY 2020 Request	\$5,000	\$44,822
FY 2021	\$15,000	TBD
FY 2022	\$25,000	TBD
FY 2023	\$25,000	TBD
FY 2024	\$25,000	TBD



NOAA-20 captured this image of the eruption of Hawaii's Kilauea Volcano on May 4, 2018, after multiple earthquakes jolted the island. The volcano spewed lava more than 300 feet into the air, and the resulting lava flows destroyed more than two dozen homes in the nearby Leilani Estates subdivision, according to the U.S. Geological Survey and media reports. The combination of hot lava flows and dangerously high levels of toxic sulfur dioxide gases in the vicinity of the eruption forced nearly 2,000 people to evacuate.

CONSTRUCTION \$2,450,000

NOAA requests \$0 in program changes for a total of \$2,450,000 in the Construction activity. This total supports repairs and renew facilities that contain critical infrastructure; maintain structural integrity through capital improvements; and to ensure availability of power and cooling necessary for NOAA's satellite ground system.

(DOLLARS IN THOUSANDS)	Satellite CDA Facility
FY 2020 Request	\$2,450
FY 2021	\$2,450
FY 2022	\$2,450
FY 2023	\$2,450
FY 2024	\$2,450



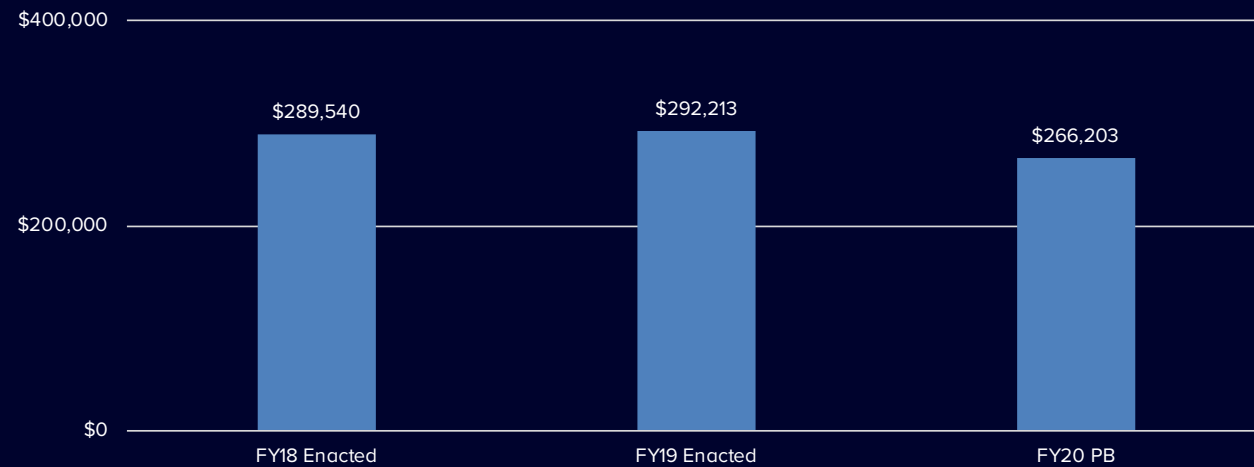
Mission Support

NOAA's Mission Support services are the backbone of NOAA's programs and mission. These activities ensure that NOAA staff have the proper work environment, the necessary tools and equipment, and vital personnel and finance services which, in turn, allow them to provide the finest possible service to the American people, the economy, and the environment.

Students get up close and personal with a Striped Burrfish to get a feel for what it is like to be a marine biologist in the ACE Basin National Estuarine Research Reserve. Photo Credit: SC Dept of Natural Resources/Erin Weeks

MS Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

NOAA implemented its Sexual Assault and Sexual Harassment (SASH) Prevention and Response Policy and onboarded a Workplace Violence Prevention Program manager.

NOAA completed a facilities enterprise baseline, footprint framework, and regional opportunities analysis as steps towards a Strategic Facilities Master plan.

The Office of the Chief Information Officer (OCIO) provided cloud-based access to NOAA's environmental data and extended the Big Data Project Cooperative Research and Development Agreement (BDP CRADA) experiment for an additional year through May 2019; over 40 NOAA datasets have been made available to industry and the public through to the BDP CRADA partners' cloud platforms, an increase of more than 34 from FY 2017. OCIO is actively exploring options with industry for sustaining this partnership in operations.

The Acquisition and Grants Office (AGO) executed over 11,000 acquisition transactions to obligate \$1,484 billion while managing over 4,300 active contracts. In addition, AGO executed over 4,000 financial assistance transactions to obligate \$1.062 billion while

managing over 500 active grants.

The Office of Human Capital Services brought time to hire down from an average of 171 days in FY 2017 to 146 days in FY 2018, a 15% improvement and NOAA completed more hires than the previous seven years.

NOAA's Hollings Scholarship Program and Educational Partnership Program with Minority Serving Institutions trained 500 students, supported 137 post-secondary degrees, and increased capacity at 24 academic institutions.

FY 2019

NOAA initiated a pilot regional analysis of the Northwest and Alaska as the first of several regional studies that will inform the Strategic Facilities Master Plan.

NOAA is developing a new entry level recruitment program, the NOAA Honors Program, designed to enhance its ability to attract diverse and talented candidates in STEM fields.

In FY 2018, the Office of Inclusion and Civil Rights (OICR) began to conduct Organizational Climate Assessments, a proactive tool that evaluates interpersonal relationships and

workgroup dynamics in an effort to identify issues that may directly impact organizational effectiveness. In FY 2019, OICR plans to continue to build out the program and promote the use of these assessments.

AGO continues to expand NOAA's strategic sourcing initiatives. NOAA awarded the Protech contract for the Fisheries domain in September 2018 and the Oceans domain in February 2019 with the contract for the Weather domain expected by the end of the year.

FY 2020 REQUEST \$266,203,000

NOAA requests a total of \$266,203,000 to position NOAA's Mission Support programs for more effective execution of NOAA's diverse mission. This total includes Operations, Research, and Facilities (ORF) and Procurement, Acquisition, and Construction (PAC) accounts and includes a net decrease of \$37,537,000 in FY 2020 program changes.

With this request, Mission Support will continue to provide services that are essential to the safe and successful execution of NOAA's mission, while strengthening NOAA's cybersecurity capabilities; ensuring the operability of NOAA's financial system; implementing NOAA's 2030 Footprint initiative; and supporting core education coordination and outreach activities.



NOAA diver in Thunder Bay National Marine Sanctuary.

NOAA is committed to ensuring a safe workplace for all NOAA staff and will ensure sufficient resources are allocated to the Workplace Violence Prevention and Response Program in FY 2020. Activities will include: prevention, response, and consultation services; development of full-time victim advocates (4-5 FTE) across the NOAA regions; development of (20-40) part-time victim advocate liaisons; the 2020 workplace violence summit; a dedicated hotline for sexual assault and sexual harassment (SASH) response services; development of toolkits for employees and management; and a workplace violence website.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Program, Project, and Activity (PPA) is located in Appendix 3. Detailed descriptions of the program changes below are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$261,205,000 to support the Operations, Research, and Facilities activities of Mission Support, reflecting a net decrease of \$17,535,000 in FY 2020 program changes.

EXECUTIVE LEADERSHIP \$28,305,000

NOAA requests an increase of \$739,000 in program changes for a total of \$28,305,000 in the Executive Leadership activity. These funds will support NOAA's centralized executive management as well as policy formulation and direction.

MISSION SERVICES AND MANAGEMENT \$154,712,000

NOAA requests an increase of \$4,260,000 in program changes for a total of \$154,712,000 for the Mission Services and Management activity. These funds will support the planning, administrative, financial, procurement,

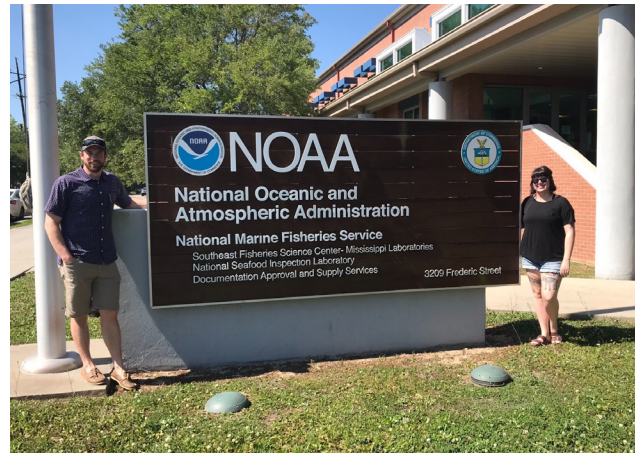
information technology, human resources, and infrastructure services that are essential to the safe and successful performance of NOAA's mission. Program change increases include:

Mission Services and Management: Silver Spring Metro Center (SSMC) Consolidation:

NOAA requests an increase of \$2,000,000 to begin consolidating its National Capital Region (NCR) presence into one primary location at the Silver Spring Metro Center (SSMC) campus. NOAA's NCR footprint includes a primary presence in Silver Spring, MD at the SSMC campus as well as outlying space nearby that houses the Office of Marine and Aviation Operations. NOAA also maintains a presence for select leadership and staff office functions at the Department of Commerce Herbert C. Hoover Building (HCHB) in Washington, DC. Additionally, the NOAA Finance Office resides in Germantown, MD. In FY 2020, NOAA will begin the move of the NOAA Finance Office to SSMC. Long-term, NOAA seeks to reduce its footprint by moving nearly all staff in these four areas to existing SSMC space while maintaining a much smaller presence for visiting staff at HCHB. Once consolidated standards have been implemented, savings will continue indefinitely going forward allowing NOAA to focus resources on mission performance.

Mission Services and Management:

Commerce Business System (CBS): NOAA requests an increase of \$2,417 to support critical upgrades needed to NOAA's Commerce Business System (CBS) financial system hardware and software. The current CBS hardware/software has reached end of life and the architecture must be refreshed in FY 2020 to maintain CBS operability. Additional funds are required to support the operations and maintenance of the new CBS architecture. Separate from the infrastructure refresh, NOAA's critical financial system reporting capability is no longer supported by the vendor and additional funds are required to transition the capability to another system.



Knauss fellows Nick Sisson and Noelle Olsen in front of the NOAA Southeast Fisheries Science Center Pascagoula Lab during the 2018 Bycatch Reduction Engineering Program Annual Meeting.

IT SECURITY \$15,079,000

NOAA requests an increase of \$4,972,000 in program changes for a total of \$15,079,000 in the IT Security activity. These funds will support bureau-level oversight of cybersecurity programs across all six NOAA Line Offices. In FY 2018, NOAA released its FY 2018-2022 Cybersecurity Roadmap, which sets forth an ambitious plan for NOAA as a whole to move from a compliance-based program to one that is risk-based, while also implementing a full suite of effective enterprise IT services. The Roadmap will be a primary driver for FY 2020 IT Security Program activities, and includes acquiring and implementing a Common Operating Picture (COP) capability to share information across the enterprise on current and future threats. Program change increases include:

IT Security: Improve Cybersecurity

Capabilities: NOAA requests an increase of \$4,972,000 to establish an effective, NOAA enterprise-wide Internal Risk Mitigation capability within NOAA's Cyber Security Program to deter, detect, and mitigate action by employees, contractors, or others, who may represent a threat to national security and NOAA's mission. These funds will address the current risk to sensitive data and operating systems from insider threats and will extend insider threat protections to NOAA's cloud computing environment. There have been documented examples of NOAA data

exfiltration to hostile powers or international competitors. Additional resources are required to develop and implement the tools to detect and respond to anomalous behavior. Adding Internal Risk Mitigation and improving cloud security capabilities will enable the NOAA Cyber Security Program to prevent data loss and protect intellectual property that is critical to NOAA's mission, human capital and reputation, and provides competitive advantage to the nation.

PAYMENT TO DOC WORKING CAPITAL FUND \$62,070,000

NOAA requests total of \$62,070,000 for the Payment to the DOC Working Capital Fund activity after adjustments of \$8,485,000. There are no program changes in this activity.

OFFICE OF EDUCATION \$1,039,000

NOAA requests a decrease of \$27,506,000 in program changes for a total of \$1,039,000 in the Office of Education activity. These funds will support a centralized Office of Education focused on coordinating and improving the performance of NOAA's numerous activities in STEM education. This request recognizes this office's critical role as primary point of contact for the National Science and Technology Council (NSTC)'s Committee on STEM for NOAA and the Department of Commerce.

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$4,998,000 to



Ashawna, Aidan, and Martice take a time-out from setting up submerged aquatic vegetation plots.

support the Procurement, Acquisition, and Construction activities of Mission Support, reflecting a net decrease of \$20,002,000 in FY 2020 program changes.

NOAA CONSTRUCTION \$4,998,000

NOAA requests a net decrease of \$20,002,000 in program changes for a total of \$4,998,000 in the NOAA Construction activity. This net decrease reflects a reduction of \$25,000,000 for funds provided in FY 2019 to complete construction of the Mukilteo Research Station. Program change increases include:

NOAA Construction: Judgment Fund: NOAA requests an increase of \$4,000,000 to repay the Judgment Fund. Construction of NOAA's Southwest Fisheries Science Center in La Jolla, CA resulted in an extended contract dispute and the Department of Justice recently approved a settlement of \$22,312,061. While Treasury paid the claimant from the Government's Judgment Fund in 2017, NOAA is required to repay the Judgment fund and has negotiated to make payments over multiple years. NOAA made an initial payment of \$10 million in FY 2018 and plans to make payments of \$4 million per year each year following until repayment is complete.

NOAA Construction: Facilities Planning:

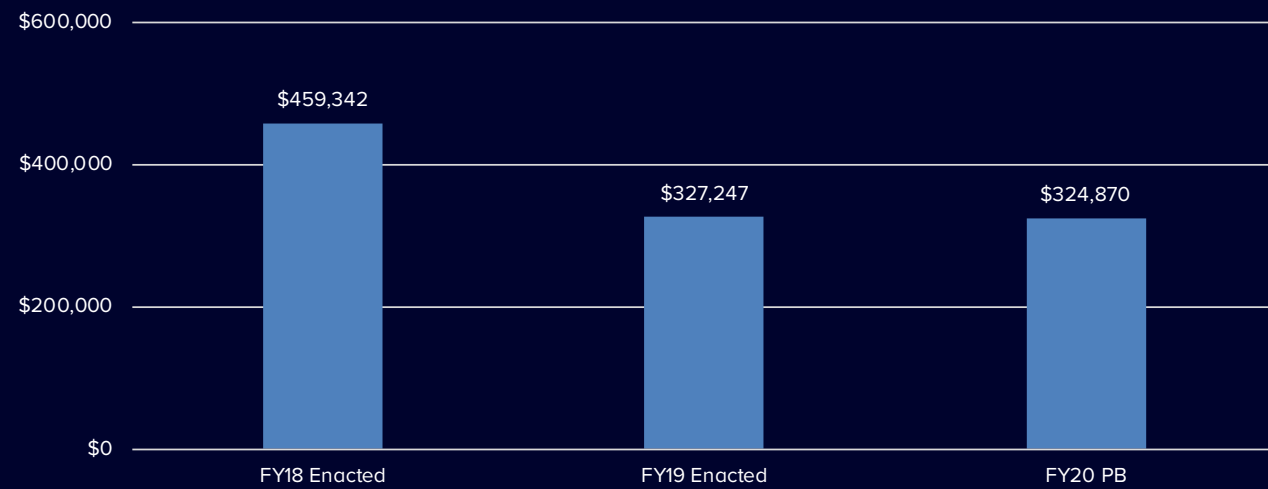
NOAA requests an increase of \$998,000 to establish recurring base funding for NOAA Construction analyses and project planning. This funding will allow NOAA to centrally plan projects and to conduct analyses and site preparation to ensure NOAA is prepared to execute major projects when project funding is received. Activities include regional analyses, business case analyses, NEPA planning, special environmental studies, condition surveys, site work, and any other preliminary development needed to ensure successful acquisition and completion of construction projects within budget and on schedule.

Office of Marine and Aviation Operations

NOAA's Office of Marine and Aviation Operations (OMAO) supports an array of specialized ships and aircraft that gather oceanographic, atmospheric, hydrographic, and fisheries data in support of NOAA's public safety, environmental stewardship, and scientific missions, which are vital to the Nation's economic security. OMAO includes civilians, mariners, and officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States. NOAA is currently authorized for 324 Corps officers, including three flag officers. OMAO civilians and NOAA Corps officers operate, manage, and maintain NOAA's active fleet of research and survey ships and specialized aircrafts.

OMAO Discretionary Budget Trends

DOLLARS IN THOUSANDS



FY 2018

In FY 2018, OMAO personnel, ships, and aircraft played a critical role in gathering environmental data vital to the nation's economic security, the safety of its citizens, and the understanding, protection, and management of its natural resources. OMAO highlights include:

NOAA Aircraft flew over 580 hurricane flight hours. The flights included reconnaissance and Tail Doppler Radar, hurricane research and life cycle, hurricane surveillance and post hurricane surveying and mapping.

NOAA's largest oceanographic research vessel, NOAA Ship *Ronald H. Brown*, completed a 243-day voyage around the world to conduct scientific research and service buoys that inform global weather, climate and ocean forecasting.

FY 2019

In FY 2019, OMAO will continue to operate its diverse vessels and aircraft to support NOAA's missions. OMAO will also sustain efforts to provide safer and more reliable platforms. OMAO highlights include:

OMAO continues efforts to acquire a new King Air and a new High Altitude Jet. These aircraft will increase NOAA's ability to meet prioritized mission requirements, consolidate the number of aircraft types in NOAA's fleet, and leverage the latest technology, enhancing NOAA's support for marine transportation as well as hurricane surveillance and research.

Earlier this year, OMAO awarded preliminary design contracts to three shipyards for the first NOAA Vessel (N/V) Class A. The N/V Class A is a survey vessel which primarily supports oceanographic monitoring, research, and modeling.

FY 2020 REQUEST \$354,945,000

NOAA requests a total of \$354,945,000 in discretionary and mandatory funds to support the continued operations of OMAO. This total includes Operations, Research, and Facilities (ORF); Procurement, Acquisition, and Construction (PAC); and other accounts and includes a net decrease of \$6,605,000 in FY 2020 program changes.

The FY 2020 request sustains NOAA's data

collection capabilities at sea and in the air, while advancing the adoption of new technologies. With these resources, OMAO will continue to invest in NOAA's ship fleet and support NOAA aircraft operations that provide observations our nation depends on to predict hurricanes, droughts, and other severe storms.

Program change increases are highlighted below. A summary of program change decreases by Line Office is located in Chapter 12 and summary of funding by Program, Project, and Activity (PPA) is located in Appendix 3. Detailed descriptions of program changes are located in the NOAA FY 2020 Congressional Justification.

FY 2020 ORF BUDGET SUMMARY

NOAA requests a total of \$231,673,000 to support the Operations, Research, and Facilities activities of the OMAO, reflecting a net increase of \$1,073,000 in FY 2020 program changes.

MARINE OPERATIONS AND MAINTENANCE \$192,422,000

NOAA requests a net decrease of \$1,801,000 in program changes for a total of \$192,422,000 in the Marine Operations and Maintenance activity. These funds will support maintenance

and operations for NOAA's diverse fleet of vessels. Program change increases include:

Marine Operations and Maintenance: Increase Marine Operations and Maintenance:

NOAA requests an increase of \$199,000 to provide for fleet operations and maintenance activities. The total request includes an investment of \$3.0 million for activities that will mitigate the impact on NOAA missions due to significant maintenance issues identified on NOAA Ship *Hi'ialakai*. These funds will increase utilization and provide for high priority maintenance activities.

AVIATION OPERATIONS AND AIRCRAFT SERVICES \$34,586,000

NOAA requests a net decrease of \$1,126,000 in program changes for a total of \$34,586,000 in the Aviation Operations and Aircraft Services activity. These resources will help provide capable, mission-ready aircraft and professional crews to safely meet NOAA's scientific mission by assisting with coastal mapping, flood prediction, hurricane prediction modeling, marine mammal population assessments, coastal erosion surveys, oil spill investigations and air quality studies.

UNMANNED SYSTEM OPERATIONS \$4,665,000

NOAA requests an increase of \$4,000,000 in program changes for a total of \$4,665,000 in the Unmanned System Operations activity. This newly established budget line will support OMAO's on-going efforts to ensure safety and regulatory compliance in NOAA's use of unmanned aircraft systems, as well as new unmanned system operations as demand for this technology grows. Program change increases include:

Unmanned System Operations: Unmanned System Program: NOAA requests an increase of \$4,000,000 to establish and sustain an Unmanned Systems (UxS) Operations Program within OMAO that will provide centralized support and guidance for unmanned marine and aircraft systems across NOAA. A



Hurricane Florence as seen from NOAA's Gulfstream IV-SP hurricane surveillance jet.



NOAA Ship *Ronald H. Brown* crew members on the ship's bridge.

centralized UxS program will support NOAA's management and standardization of safety, training, inspections, and operational reviews. It will also manage the agency's acquisitions, operations, and maintenance to ensure that platforms are standardized, efficiently meet NOAA requirements, and are in compliance with Federal requirements.

FY 2020 PAC BUDGET SUMMARY

NOAA requests a total of \$91,700,000 to support the Procurement, Acquisition, and Construction activities of the OMAO, reflecting a decrease of \$7,678,000 in FY 2020 program changes.

MARINE AND AVIATION CAPITAL INVESTMENTS \$91,700,000

NOAA requests a decrease of \$7,678,000 in program changes for a total of \$91,700,000 in the Marine and Aviation Capital Investments activity. These resources will enable OMAO to continue implement its fleet recapitalization plan and maintain its vessels that play a critical role in the in-situ collection of oceanographic, atmospheric, hydrographic, and fisheries data in support of NOAA's missions. This total includes an investment to extend the service life of NOAA's Fleet by stabilizing the material condition of ships.

DISCRETIONARY FUNDS MEDICARE-ELIGIBLE RETIREE HEALTHCARE FUND CONTRIBUTION

The FY 2003 Department of Defense Authorization Act requires all uniformed services, including NOAA, to participate in an accrual fund for Medicare-eligible retirees. Payments into this accrual fund will cover the future healthcare benefits of present, active-duty NOAA officers and their dependents and annuitants. FY 2020 payments to the accrual fund are estimated to be \$1,497,000.

MANDATORY FUNDS NOAA CORPS COMMISSIONED OFFICERS RETIREMENT

The retirement system for the uniformed services provides a measure of financial security after release from active duty for service members and their survivors. It is an important factor in the choice of a career in the uniformed services and is mandated by Federal statutes under Title 10, United States Code. NOAA transfers retirement pay funds to the U.S. Coast Guard, which handles the payment function for retirees and annuitants. Healthcare funds for non-Medicare eligible retirees, dependents, and annuitants are transferred to the U.S. Public Health Service which administers the health case program.



Hydrographic survey launches from NOAA Ship *Fairweather* return to the ship after finishing data acquisition for the day in Yakutat Bay, Alaska.

Summary of Program Change Reductions

NOAA's FY 2020 Budget request reflects the commitment 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. This FY 2020 Budget request includes the core infrastructure and capabilities that professionals at NOAA need to provide the critical services that the American people require.

Chapter 12 summarizes the reductions made in FY 2020 to allow NOAA to prioritize its core mission, to advance its goals of reducing the impacts of extreme weather and water events to save lives and protect property by implementing Public Law 115-25, Weather Research and Forecasting Innovation Act of 2017, and Public Law 115-423, National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018, and maximizing the economic contributions of our ocean and coastal resources, and to advance space innovation. Reductions below are dollars in thousands.

National Ocean Service

ORF

REDUCE FUNDING FOR REPAIR/REPLACEMENT OF COASTAL OBSERVING ASSETS -\$1,500

NOAA proposes to decrease funding for the repair or replacement of coastal observing assets. NOAA will continue to prioritize maintenance and replacement to ensure functionality of critical observing assets.

REDUCE FUNDING FOR THE COASTAL MAPPING PROGRAM -\$500

NOAA proposes to decrease funding for the Coastal Mapping Program. The Coastal Mapping Program defines the Nation's 95,000-mile shoreline and near-shore bathymetry. This program also supports the continued development and advancement of geospatial analytical and mapping techniques to precisely update shorelines in a common data format.

ELIMINATE REGIONAL GEOSPATIAL MODELING GRANTS -\$8,000

NOAA requests to terminate the Regional Geospatial Modeling Grant program. NOAA will continue to support a range of other regional geospatial requirements through NOS's Coastal Zone Management and Services and Navigation, Observations and Positioning program activities.

ELIMINATE SINGLE-YEAR GRANTS TO JOINT OCEAN AND COASTAL MAPPING CENTER -\$2,000

NOAA proposes to discontinue new funding awards for the joint ocean and coastal mapping centers in Mississippi. NOAA will continue to support these efforts through its Coast Survey Development Laboratory, which explores and develops survey, geospatial data management, and cartographic technologies, and other Navigation, Observation and Positioning programs.

HYDROGRAPHIC SURVEY PRIORITIES/CONTRACTS -\$5,051

NOAA requests to reduce the acquisition of hydrographic data from contract surveys. NOAA will continue to acquire hydrographic survey data from contract surveyors with the remaining funds in support of safe and efficient transportation and commerce.

REDUCE INTEGRATED OCEAN OBSERVING SYSTEM REGIONAL OBSERVATION GRANTS -\$19,056

NOAA requests to reduce grants to the IOOS Regional Observations Program. NOAA will continue to support the 11 IOOS Regional Associations at the reduced funding level.

TERMINATE NATIONAL CENTERS FOR COASTAL OCEAN SERVICE -\$23,664

NOAA requests to terminate the National Centers for Coastal Ocean Science (NCCOS) while sustaining its most important research areas. NOAA will retain \$8.8 million of funding and personnel to sustain key components of the NCCOS science portfolio; specifically, harmful algal bloom, hypoxia, and pathogen research, prevention, and forecasting; habitat and species forecasting; and marine aquaculture siting science and tool development.

ELIMINATE NCCOS COMPETITIVE FUNDING SUPPORT FOR RESEARCH ON ECOLOGICAL THREATS -\$18,000

NOAA proposes to eliminate the NCCOS Competitive Research program, which provides grants to academic institutions to conduct ecological research that advances NOAA's missions.

ELIMINATE FUNDING SUPPORT FOR INTEGRATED WATER PREDICTION -\$2,576

NOAA proposes to eliminate funding for the NOS portion of the Integrated Water Prediction (IWP) project. With this reduction, NOS will continue to engage in the NOAA Water Team, but would significantly curtail development of new products and services for end users.

ELIMINATE COASTAL ZONE MANAGEMENT GRANTS -\$75,500

NOAA requests a decrease to eliminate grants within the Coastal Zone Management (CZM) Program that support actions of states and other grantees authorized under the Coastal Zone Management Act (CZMA). NOAA will continue to support states' participation in the National CZM program by reviewing and supporting implementation of states' management plans, supporting Federal consistency reviews, and providing technical assistance services.

ELIMINATE FEDERAL FUNDING SUPPORT FOR THE TITLE IX FUND -\$30,000

NOAA requests to eliminate Federal funding support for Title IX of the National Oceans and Coastal Security Act, which allows grants to be awarded through a partnership between the National Fish and Wildlife Foundation (NFWF) and NOAA.

REDUCE FUNDING FOR INNOVATIVE CORAL REEF RESTORATION INITIATIVES -\$1,572

NOAA proposes to decrease funding for innovative coral reef restoration initiatives to restore degraded coral reefs. In FY 2020, NOAA will continue to work with its partners to protect and restore coral reefs, prioritizing the most promising projects.

ELIMINATE FEDERAL FUNDING SUPPORT FOR NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM -\$27,000

NOAA proposes to discontinue NOAA grants to state agencies and academic institutions that support operations of the National Estuarine Research Reserve System (NERRS). Under this proposal, NOAA will continue to provide national-level system coordination and in-kind support to state agencies and academic institutions that choose to continue operating the reserves using state funds.

ELIMINATE RESEARCH GRANTS FOR MONUMENTS -\$1,000

NOAA requests a decrease to eliminate Federal funding for Marine Sanctuaries research grants for Marine National Monuments. These Congressionally directed grants provide funding for competitive research and management grants for the Papahānaumokuākea Marine National Monument.

ELIMINATE TELEPRESENCE RESEARCH GRANTS -\$3,500

NOAA requests a decrease to eliminate Federal funding for Marine Sanctuaries Telepresence Grants. These Congressionally directed grants provide funding to explore and document the deep-sea oceanography, marine habitats, cultural sites, and living and non-living resources in and around national marine sanctuaries to better understand their biology, ecology, geology, and cultural resources.

PAC

ELIMINATE FEDERAL FUNDING FOR NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM CONSTRUCTION -\$1,900

Eliminate Federal funding support to states for National Estuarine Research Reserve System land acquisition and construction. NOAA will continue to provide national-level system coordination and in-kind support to state governments that choose to continue operating the reserves using state funds.

REDUCE NATIONAL MARINE SANCTUARIES CONSTRUCTION -\$459

Reduce scalable funding for design and installation of signage, exhibits, and kiosks, maintenance of

vessels, and facility construction and maintenance. NOAA will defer projects to improve the condition of these facilities and increase the use of operational funds to conduct maintenance where appropriate.

National Marine Fisheries Service

ORF

ESA AND MMPA PERMITTING CAPACITY **-\$2,599**

Reduces the additional resources provided in the Consolidated Appropriations Act, FY 2019 to work with Federal partners to improve coordination and efficiency of consultations within the permitting processes. While it will decrease consultation and permitting capacity that supports requirements of the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA), NMFS will continue to focus on these activities with remaining resources.

PRESCOTT GRANTS PROGRAM **-\$4,000**

Eliminates funding for this grant program. NOAA will continue to support related activities such as the rescue of large whales entangled in fishing gear and the coordination network responses to unusual marine mammal mortality events.

RIGHT WHALE RECOVERY **-\$1,000**

Reduces the additional resources provided in the Consolidated Appropriations Act, FY 2019 to increase research and monitoring of North Atlantic right whales to better understand how the species interacts with fisheries and shipping traffic and is adapting to changing ocean conditions and shifting feeding grounds; however, NMFS will continue to support right whale recovery.

SPECIES RECOVERY GRANTS PROGRAM **-\$1,009**

Reduces conservation and recovery of marine and anadromous species through the Species Recovery Grant Program. This level of funding will allow NMFS to continue to adequately support our state and tribal partners in species recovery.

HATCHERY GENETIC MANAGEMENT PLANS **-\$2,000**

Reduces the additional resources previously provided to work with partners to help expedite Hatchery Genetic Management Plans (HGMP) review. With the

FY 2018 resources, NMFS completed review of an additional 51 HGMPs in bringing the total to 197 out of 330 HGMPs completed. NMFS expects to continue to make progress in HGMP review, and NMFS will continue these reviews in FY 2020.

NMFS FACILITIES **-\$4,000**

Reduces funding for science facilities to support NOAA's goal of a more efficient Federal footprint. Operating costs will be reduced by divesting three owned properties combined with savings from avoidance of deferred maintenance associated with one of the facilities in the Fisheries and Ecosystem Science Programs and Services budget line. These represent initial actions to reduce NOAA's footprint.

NORTHEAST GROUND FISH RESEARCH **-\$2,000**

Reduces funding previously provided by Congress for New England groundfish research. NOAA studied the effects of changing climatic conditions and warming waters on the fishery, including stock health and natural mortality through ten research projects.

ANTARCTIC RESEARCH **-\$2,967**

Eliminate funding for NOAA's Antarctic Ecosystem Research Program through the reduction of staffing through attrition. NOAA will also transition approximately 12 FTEs into other positions for which they are qualified, and will work diligently to mitigate any impact to affected employees.

REEF FISH STOCK ASSESSMENTS **-\$7,486**

Reduces Congressionally-directed funding for development and implementation of agency-independent and alternative approaches to research and stock assessments for reef fish in the Gulf of Mexico and Atlantic. NOAA will continue to produce stock assessments for the Gulf of Mexico reef fish complex as part of its national stock assessment process.

COOPERATIVE RESEARCH PROGRAM **-\$2,980**

Reduces funding for the Cooperative Research program, which will lead to approximately ten fewer projects funded in FY 2020. The program will continue to execute cooperative research with industry, fishermen, and other stakeholders.

NORTHEAST FISHERY OBSERVERS **-\$10,300**

Reduces additional Congressionally-directed funding for the Northeast At-Sea Monitoring Program (ASM). An additional \$10.3 million was provided to fully fund the cost of ASM in the New England groundfish fishery, including at-sea and shoreside infrastructure costs.

SEAFOOD IMPORT MONITORING PROGRAM IMPLEMENTATION **-\$1,200**

Reduces additional funding previously provided for specific implementation requirements of the Seafood Import Monitoring Program (SIMP). SIMP establishes reporting and recordkeeping requirements for imports of priority seafood products to prevent illegal, unreported, and unregulated seafood from entering U.S. commerce.

NATIONAL CATCH SHARE PROGRAM **-\$4,147**

Reduces support for implementation of new catch share programs; data collection improvements for recently implemented programs; and, national-level coordination to improve efficiency in the development and implementation of catch share programs. NOAA will continue to provide support for the 16 programs currently under catch share management.

GENETIC STOCK IDENTIFICATION AND PACIFIC SALMON TREATY **-\$5,520**

Reduces funding for Mitchell Act hatcheries and implementation of the Pacific Salmon Treaty. At the requested level, NOAA will reduce the additional funding provided by Congress for genetic stock identification by \$1.1 million within the Mitchell Act hatchery program. In addition, NOAA will reduce additional funding provided for Pacific Salmon Treaty implementation by \$4.4 million for a total of \$11.2 million. Resource requirements for the recently negotiated Pacific Salmon Treaty are still being reviewed and analyzed.

INTERSTATE FISHERY MANAGEMENT COMMISSIONS **-\$3,663**

Reduces funding for the three Interstate Fishery Management Commissions. Congressionally directed funding provided increases specific to the Interstate Fishery Management Commissions. The FY 2020 President's Budget does not include these

additional resources, and proposes a total of \$8.6 million for Interstate Fishery Commissions.

INTERJURISDICTIONAL FISHERIES GRANTS **-\$3,365**

Eliminates financial assistance program to promote state activities in the management of interjurisdictional fisheries resources. Grants are non-competitive, formula-based, and provide support to 38 states and territories to aid in the state/Federal management of U.S. fisheries.

AQUACULTURE **-\$2,118**

Reduces additional funding provided by Congress to coordinate and streamline interagency marine aquaculture permitting requirements. At the requested level, NOAA will reduce resources available to resolve regulatory bottlenecks (e.g., environmental compliance, cooperation and coordination with state permitting authorities) relative to Federal approval of marine aquaculture permits, but continue to focus on these activities with available resources.

COOPERATIVE ENFORCEMENT PROGRAM **-\$18,279**

Eliminates funding to support the Cooperative Enforcement Program (CEP). NOAA will not be able to implement Joint Enforcement Agreements (JEA) with 27 state and U.S. territory partners. These JEAs provide funds to state and U.S. territorial law enforcement agencies to perform enforcement services in support of Federal regulations.

ESSENTIAL FISH HABITAT CONSULTATIONS **-\$3,000**

Reduces additional funding provided by Congress for Essential Fish Habitat (EFH) Consultations. NMFS will continue to perform EFH consultations with available resources.

FISHERIES HABITAT GRANTS **-\$14,880**

Eliminates grants for on-the-ground habitat restoration projects. Since the program's beginning, NOAA has implemented more than 2,000 habitat restoration projects through partnerships with over 2,500 organizations across the Nation. NMFS will continue to provide technical expertise and leadership to states, tribes, and local communities, as well as other programs and Federal agencies

implementing fishery and coastal habitat restoration projects as resources allow.

PACIFIC COASTAL SALMON RECOVERY FUND -\$65,000

Eliminates funding for this grant program but will continue its Federal commitment to advancing Pacific salmon and steelhead recovery and Tribal treaty fishing rights through other NOAA programs as resources allow.

FISHERIES DISASTER ASSISTANCE FUND -\$15,000

Eliminates funding provided by Congress in the Consolidated Appropriations Act, FY 2019. NOAA will work with the states and Tribes with respect to future disaster determinations and shall work with the Congress if future funding is necessary for declared disasters. The Administration understands the importance of fishery disaster funds to affected states, Tribes, and communities to help them recover from the disaster and prevent similar fishery failures in the future.

Oceanic and Atmospheric Research

ORF

CLIMATE LABORATORIES AND COOPERATIVE INSTITUTES DECREASE -\$498

NOAA will decrease the funding within the OAR Climate Laboratories. These activities include socioeconomic studies on the localized impacts of severe weather and seasonal to decadal climate work to help NOAA meet its mission responsibilities to inform long-term planning and preparedness.

ARCTIC RESEARCH ELIMINATION -\$1,940

NOAA will eliminate Arctic research within the Climate Laboratories & Cooperative Institutes PPA. NOAA will terminate some Arctic research products and improvements to operational sea ice modeling and predictions.

ARCTIC RESEARCH ELIMINATION -\$3,745

NOAA will eliminate Arctic research within the Regional Climate Data & Information PPA. NOAA will terminate some Arctic research products and improvements to operational sea ice modeling and predictions.

ELIMINATE CLIMATE COMPETITIVE RESEARCH FUNDING -\$20,760

NOAA will eliminate climate competitive research activities in the Regional Climate Data and Information PPA, terminating the Regional Integrated Sciences and Assessments Program (RISA) program, and eliminating NOAA's portion of the funding for the National Climate Assessment. NOAA will continue to support NIDIS and other high priority programs.

CLIMATE COMPETITIVE RESEARCH PPA ELIMINATION -\$40,048

NOAA will eliminate the Climate Competitive Research PPA, which will terminate all climate research programs within the Climate Program Office with the exception of NIDIS, and reduce competitive research grants to cooperative institutes, universities, NOAA laboratories and other partners.

AIR RESOURCES LABORATORY CLOSURE -\$4,843

NOAA will close the Air Resources Laboratory and eliminate ARL's research on air chemistry, mercury deposition, and atmospheric dispersion of harmful materials in order to fund other priority programs. Program priorities will be folded into other NOAA labs.

THE UNMANNED AIRCRAFT SYSTEMS (UAS) PROGRAM OFFICE CLOSURE -\$5,397

NOAA will close its program office and intramural grants dedicated to the research, development, and transition to application of new UAS observing strategies. The FY 2020 President's Budget requests a program increase of \$4.0 million for a new operational program to efficiently and effectively manage use of unmanned systems across NOAA within Office of Marine and Aviation Operations.

THE VORTEX-SOUTHEAST TERMINATION -\$4,966

NOAA will terminate Vortex-Southeast (VORTEX-SE), a project that seeks to improve tornado forecasts in the southeastern U.S.

WEATHER LABORATORIES AND COOPERATIVE INSTITUTES DECREASE -\$4,762

NOAA will decrease the funding used to advance priority activities in its Weather Labs and CIs funding line, including HPC recapitalization of the Boulder

jet supercomputer, Forecasting a Continuum of Environmental Threats (FACETs), data assimilation initiatives, and other activities that support implementation of the Weather Act.

AIRBORNE PHASED ARRAY RADAR (APAR) TERMINATION -\$2,600

NOAA will terminate research and development on improving the detection and understanding of severe weather with a new airborne phased array radar (APAR) and other airborne measurements.

INFRASONIC WEATHER MONITORING RESEARCH TERMINATION -\$2,000

With this reduction, NOAA will conclude infrasonic monitoring research. NOAA has completed an evaluation of this technology using congressionally directed funding in FY 2016, FY 2017, and FY 2018.

U.S. WEATHER RESEARCH PROGRAM (USWRP) DECREASE -\$4,863

NOAA will decrease the funding used to advance priority activities in U.S. Weather Research Program, which in FY 2019 included: economic studies, initiating EPIC, and establishing capability to develop and evaluate the National Water Model.

JOINT TECHNOLOGY TRANSFER INITIATIVE DECREASE -\$17,000

NOAA will decrease the funding used to accelerate the transition of the most promising research activities within NOAA and the weather enterprise into NWS operations through testing, demonstrating, and partnerships with important external partners. Additional investments in research that shows greatest promise to transition into operations will be offset by corresponding decreases to less promising research efforts.

AUTONOMOUS UNDERWATER VEHICLE DEMONSTRATION TESTBED TERMINATION -\$3,000

NOAA will eliminate the autonomous underwater vehicle (AUV) demonstration testbed, slowing the pace of evaluating new technologies for ocean observations. Without testbed funding, testing and evaluations in the marine environment will be performed with cruises planned for another purpose to conduct scientific research.

GENOMICS TERMINATION -\$1,880

NOAA will eliminate the environmental genomics program at the Atlantic Oceanographic and Meteorological Laboratory (AOML), which studies Deoxyribonucleic acid (DNA), Ribonucleic acid (RNA), and proteins to better understand what organisms are present, what they are doing, and how they are affected by changing ocean conditions.

OCEANS, COASTS & GREAT LAKES LABORATORIES AND COOPERATIVE INSTITUTES DECREASE -\$2,594

NOAA will decrease the funding used to advance priority activities in its Ocean, Coastal, and Great Lakes Labs and CIs funding line.

NATIONAL SEA GRANT COLLEGE PROGRAM TERMINATION -\$80,071

NOAA will terminate the National Sea Grant College Program Base and Marine Aquaculture Program. This will eliminate NOAA funding for the network of 33 Sea Grant programs located in coastal States and territories, and withdraw support for the larger cross-NOAA Aquaculture Program.

OCEAN EXPLORATION DECREASE -\$22,449

NOAA will decrease its extramural ocean exploration and research efforts by reducing funding to the Cooperative Institute for Ocean Exploration, Research and Technology, the Global Foundation for Ocean Exploration, and the interagency Biodiversity Observation Network. NOAA will maintain support for the highest priority activities.

INTEGRATED OCEAN ACIDIFICATION DECREASE -\$3,994

NOAA will reduce funding for the Integrated Ocean Acidification Program that conducts research on ocean and coastal acidification (OA) and its impacts on marine resources, coastal communities, and economies.

SUSTAINED OCEAN OBSERVATION AND MONITORING DECREASE -\$6,007

NOAA will reduce external grant funding that is used to leverage partnerships to develop a sustained, comprehensive, and responsive global ocean observing system. NOAA currently maintains about 50 percent of the world's ocean

observing platforms. This reduction will reduce the number of platforms NOAA and its partners can help maintain.

OCEANOGRAPHIC RESEARCH PARTNERSHIP PROGRAM TERMINATION -\$5,500

NOAA will terminate the Oceanographic Research Partnership Program (ORPP), and activities conducted under ORPP will be continued under the National Oceanographic Partnership Program (NOPP).

PAC

MISSISSIPPI STATE PARTNERSHIP TERMINATION -\$15,000

Terminate partnership funding with Mississippi State University established by congressionally directed requirements to develop a dedicated high performance computing facility in collaboration with partners with existing high performance computing expertise and scientific synergies.

National Weather Service

ORF

REDUCE SURFACE OBSERVATIONS -\$12,500

NOAA will reduce the National Mesonet Program, which gathers “mesoscale meteorological” observation. NOAA will reduce the geographic scope from all 50 states to prioritize states most susceptible to tornadoes and severe weather and limit the observations to surface meteorological observations and lightning.

REDUCE MARINE OBSERVATIONS -\$1,500

NOAA will terminate support for the NOAA Water Level Observation Network (NWLON) and the U.S. Geological Survey Seismic network, but will maintain its full array of Deep-ocean Assessment and Reporting of Tsunamis (DART®) moorings to support the tsunami mission.

REDUCE MARINE OBSERVATIONS TROPICAL ATMOSPHERE OCEAN PLATFORM -\$1,300

NOAA will reduce the Tropical Atmosphere Ocean (TAO) Platform 55-buoy array by 15 moorings, while maintaining 80 percent availability for the remaining network. This reduction may delay recognition of the onset of an El Niño and the Southern Oscillation (ENSO) phenomenon.

REDUCE UPPER AIR OBSERVATIONS -\$2,271

NOAA will reduce the geographic scope and purchase of observations performed by aircraft and will eliminate the aircraft observations over other parts of the oceans and in other continents. NOAA will reduce the number of reserve radiosondes, to an amount needed for daily operations only.

ESTABLISHMENT OF REGIONAL ENTERPRISE APPLICATION DEVELOPMENT AND INTEGRATION TEAMS -\$10,100

NOAA proposes to initiate a phased consolidation of the NWS 122 Information Technology Officers (ITO) located at each WFO. Consolidating IT support functions is a critical part of evolving the NWS, including a right-sized workforce and appropriate organizational structure.

SLOW ADVANCED HYDROLOGIC PREDICTION SYSTEM EXPANSION -\$2,000

NOAA will slow the expansion of new technology at AHPS forecast locations, reducing training and implementation support. Without additional funding, NOAA will delay/forgo aspects of the planned research and development needed to address known limitations in HEFSv1—such as the ability to incorporate the effects of reservoir regulation and improve performance for large precipitation events.

NWS WORKFORCE SAVINGS -\$15,000

This program change request reduces forecast personnel by implementing recommendations outlined in NWS’ Operations and Workforce Analysis (OWA) which will enable NWS to continue to evolve and build a Weather-Ready Nation. The OWA recognizes inherent inefficiencies associated with the rigid field office structure of NWS and provides various recommendations to make the agency more effective and efficient to protect lives and property.

REDUCE TSUNAMI WARNING PROGRAM -\$11,000

NOAA will eliminate the Tsunami Research and Operational Warning program as a national service program and merge the Pacific Tsunami Warning Center (PTWC) in Hawaii and the National Tsunami Warning Center (NTWC) in Alaska. NOAA proposes to continue to fund critical operational tsunami program components to ensure high-quality tsunami

watches, warnings, and advisories at one center.

TERMINATE AVIATION SCIENCE RESEARCH TO OPERATIONS -\$1,806

In coordination with the proposed program change in the Science and Technology Integration activity, NOAA will terminate aviation science research and development and R2O transition efforts. With this reduction, NOAA will maintain current levels of operational aviation weather forecast products and services, but will terminate efforts to complete, develop and implement aviation tools and capabilities that support the Next Generation Air Transportation System (NextGen).

CONSOLIDATE CLIMATE PREDICTION CENTER/WEATHER PREDICTION CENTER FUNCTIONS -\$1,200

NOAA will create one national center spanning the continuum of prediction services from the present through existing sub-seasonal and seasonal time domains. This consolidation will limit some of NOAA’s products and services such as climate prediction products with domains over hemispheres other than North America/Arctic.

REDUCE DEFERRED MAINTENANCE SUPPORT -\$8,000

NOAA will eliminate dedicated funding to support deferred maintenance for NWS operational field facilities. Deferred maintenance will be addressed within the Analyze Forecast and Support activity.

REDUCTION TO OFFICE OF WATER PREDICTION CENTER STAFFING SUPPORT -\$1,500

By FY 2020, the directed hiring for the Water Prediction Operations Division (WPOD) at the National Water Center will be completed. NOAA is committed to maintaining these staffing levels in the WPOD. However, this funding level could not be maintained in the FY 2020 President’s Budget. Difficult decisions were made and staffing may be reduced within other areas of the Office of Water Prediction.

REDUCE THE INVESTMENT IN NUMERICAL WEATHER PREDICTION MODELING -\$2,101

NOAA will slow 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. This reduction in may be offset by the Earth Prediction Innovation Center, established in the National Integrated Drought Information System Reauthorization Act of 2018, and funded within OAR.

TERMINATE HYDROLOGY AND ADDITIONAL WATER RESOURCES -\$6,000

NOAA will terminate the program to collaborate with external academic partners to improve fine- and large-scale measurements of snow depth and soil moisture data in order to improve the National Water Model.

TERMINATE COASTAL ACT -\$5,000

NOAA proposes to terminate efforts associated with the Consumer Option for an Alternative System To Allocate Losses (COASTAL) Act of 2012 implementation within NWS, including efforts to develop the capability to produce detailed “post-storm assessments” in the aftermath of a damaging tropical cyclone that strikes the U.S. or its territories.

TERMINATE AVIATION SCIENCE RESEARCH TO OPERATIONS -\$1,000

In coordination with the proposed program change in the Analyze, Forecast and Support PPA, NOAA will eliminate aviation science research-to-operations. NWS will maintain the current level of operational aviation weather forecast products and services.

PAC

REDUCE SERVICE LIFE EXTENSION PROGRAM FOR NEXT GENERATION WEATHER RADAR -\$2,379

Planned program decrease to the Service Life Extension Program (SLEP) to sustain aging Next Generation Weather Radar (NEXRAD) infrastructure. NEXRAD SLEP is a multi-year effort that began in FY 2015 and was originally anticipated to be completed in 2022. The SLEP will extend the useful life of the NEXRAD array by approximately 15 years.

REDUCE SERVICE LIFE EXTENSION PROGRAM FOR AUTOMATED SURFACE OBSERVING SYSTEM -\$2,500

Planned program decrease for the SLEP to sustain aging Automated Surface Observing System (ASOS) infrastructure. ASOS SLEP began in FY 2017 and was originally anticipated to be completed in 2023. Data from the ASOS is required by Department of Transportation for flights for take-off

and landings at airports across the country. Performing a SLEP is critical to ensuring availability of the observing system until at least 2040.

ELIMINATE INTEGRATED WATER PREDICTION HIGH PERFORMANCE COMPUTING -\$4,172

Eliminate funding to procure additional high performance computing resources to support coupling of the current generation of terrestrial and coastal models and develop the next generation of integrated Earth system coupled models necessary to expand NOAA's hydrologic products and services.

REDUCE RESEARCH AND DEVELOPMENT HIGH PERFORMANCE COMPUTING -\$4,000

Eliminate the "Jet" supercomputing system and associated contract support in Boulder, CO and reduce NWS's supercomputing use and associated contract support in Fairmont, WV. Major transition projects will need to compete for space on NOAA's remaining supercomputing assets.

COMPLETION OF WFO/RFC SLIDELL OFFICE & RADAR RELOCATION -\$10,366

Decrease will reflect the completion of the Weather Forecast Office and River Forecast Center and associated radar relocation in Slidell, LA. FY 2019 funding was used for this one-time relocation project which will be complete in FY 2023.

National Environmental Satellite Data and Information Service

ORF REGIONAL CLIMATE CENTERS TERMINATION -\$3,650

Terminate the Regional Climate Centers (RCCs) that provides climate services tailored to the specific needs of the region within which it is located. RCCs respond to emerging issues, such as droughts and floods and each RCC is located at six universities and research institutions that are responsible for managing the RCC resources from NOAA and non-NOAA sources alike. The termination will allow for better support of other existing NOAA priorities.

PAC POLAR WEATHER SATELLITES DECREASE -102,953

Planned funding reduction to the Joint Polar Satellite System (JPSS) program of record. The remaining funds will be used to continue the build of the JPSS-2 instruments and spacecraft, continue JPSS-2 satellite level integration and testing, and continue the development of the spacecraft and instruments for JPSS-3 and JPSS-4.

GOES-R SERIES PLANNED DECREASE -104,324

Planned funding reduction to the Geostationary Operational Environmental Satellite-R (GOES-R) Series program. The remaining funds will continue satellite engineering development, production and integration for the GOES-R Series program.

METOP PLANNED DECREASE -9,339

Planned funding reduction to Metop. At the time of the FY 2019 President's Budget, NOAA was still evaluating funding for Metop-SG beyond FY 2019 and outyear support was not included in the outyear profile. NOAA now has an FY 2020 funding estimate for Metop-SG and requests the necessary funds in the FY 2020 President's Budget to continue to leverage NOAA's partnership with European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for Metop SG satellite polar satellite data.

COOPERATIVE DATA AND RESCUE SERVICES (CDARS) PLANNED DECREASE -11,689

Funding level requested in FY 2020 will allow NOAA to continue supporting the Argos Advanced Data Collection and location System and Search and Rescue Satellite Aided Tracking Medium Earth Orbit Search and Rescue programs. Funding in FY 2020 will support the launch of the Argos A-DCS instrument as a hosted payload to low Earth orbit on a commercial spacecraft by late 2021 and the completion of the Southwest USA (SUSA) Medium Earth Orbiting Local User Terminal (MEOLUT) ground station in New Mexico.

SPACE WEATHER DECREASE -1,400

Funding level requested in FY 2020 will allow NOAA to continue development of two Compact Coronagraphs (CCOR) under an interagency agreement with the U.S. Naval Research Laboratory (NRL), continue development of the Solar Wind Instrument Suite (SWIS) for the Space Weather Follow On

Earth-Sun Lagrange 1 (SWFO-L1) mission, and work with National Aeronautics and Space Administration (NASA) to launch the SWFO-L1 mission as a ride-share with NASA's Interstellar Mapping and Acceleration Probe (IMAP) launch.

GEO COMMON PRODUCTS AND SERVICES -2,816

Funding level requested in FY 2020 will provide ground system support, including technology refresh and hardware and software. NOAA will move forward, albeit at a slower pace, with the common ground services activities to plan, execute, acquire, integrate, and transition to operations all common services for NOAA's environmental satellite systems.

COMMERCIAL WEATHER DATA PILOT DECREASE -3,000

Decrease in funding will allow NOAA to continue executing pilots for the next available commercial data type. These pilots are critical to NOAA's future satellite architecture as they assess operational viability of possible future commercial capabilities. The next pilot will focus on commercially available data that may improve numerical weather prediction, consistent with the Weather Research and Forecasting Innovation Act of 2017, and on emerging commercial sector capabilities, consistent with the NOAA Commercial Space Policy.

Mission Support

ORF OFFICE OF EDUCATION -\$20,006

Eliminate funding for the Competitive Education Grants Program (\$3,000), and the Educational Partnership Program for Minority Serving Institutions (EPP/MSI) (\$16,000) within the Office of Education and reduce fund for the Office of Education (\$1,006). Remaining funds for the Office of Education of \$1,039 will support a centralized office focused on coordinating and improving the performance of NOAA's numerous activities in STEM education.

NOAA BAY-WATERSHED EDUCATION AND TRAINING (B-WET) REGIONAL PROGRAM -\$7,500

Terminate the Bay-Watershed Education and Training (B-WET) Regional Program. NOAA's operating plan

for FY 2019 provided \$7,500 for B-WET regional programs, which promote place-based, experiential learning in K-12 Science, Technology, Education, & Mathematics (STEM) education.

PAC NATIONAL MARINE FISHERIES SERVICE FACILITIES INITIATIVE -\$25,000

Decrease to reflect full funding for the replacement of the Northwest Fisheries Science Center facility in Mukilteo, Washington. The funding received in FY 2017–2019 is sufficient to complete the project, with a full project cost of approximately \$40 million. This facility is a priority because of its structural condition and is slated for completion in late FY 2022.

Office of Marine and Aviation Operations

ORF UNMANNED SURFACE VEHICLES -\$2,000

NOAA requests a decrease to end competitive acquisition of data from unmanned surface vehicles (USVs). Unmanned surface vehicles remain a potential complement to NOAA's fleet, and NOAA programs may continue to explore the use of USVs to meet their missions within existing resources. NOAA will provide coordinated, NOAA-wide operational support for USVs through a new Unmanned Systems Operational Program.

ELIMINATE ATMOSPHERIC RIVERS FLIGHT HOURS -\$1,000

NOAA requests a decrease to reduce additional congressionally-directed funds provided in FY 2019 for the monitoring of atmospheric rivers.

PAC PROGRESSIVE LIFECYCLE MAINTENANCE -\$7,678

Decrease in funds for capital repairs to NOAA's ship fleet. Funding provided in FY 2018 and FY 2019 are helping to address the deferred maintenance backlog on NOAA vessels. Funds provided in FY 2020 will be used to meet priority at-sea requirements and improve Fleet support to NOAA's mission-critical nautical charting, bathymetric mapping, fisheries research, ecosystem assessments, coastal-ocean circulation, and oceanographic and atmospheric research.

Proposed Changes to General Provisions

NOAA seeks the following changes to the General Provisions in its FY 2020 budget submission. For a more detailed discussion of the justification for these proposed changes, please consult the FY 2020 Congressional Justification.

1. NOAA Cost Recovery Language
 SEC. 109. To carry out the responsibilities of the National Oceanic and Atmospheric Administration (NOAA), the Administrator of NOAA is authorized to: (1) enter into grants and cooperative agreements with; (2) use on a non-reimbursable basis land, services, equipment, personnel, and facilities provided by; and (3) receive and expend funds made available on a consensual basis from: a Federal agency, State or subdivision thereof, local government, tribal government, territory, or possession or any subdivisions thereof, foreign government, international or intergovernmental organization, public or private organization, or individual: Provided, That funds received for permitting and related regulatory activities pursuant to this section shall be deposited under the heading “National Oceanic and Atmospheric Administration—Operations, Research, and Facilities” and shall remain available until expended for such purposes: Provided further, That all funds within this section and their corresponding uses are subject to section 505 of this Act.

Justification

NOAA proposes to clarify NOAA’s ability to receive and expend funds from, and to engage in agreements with, external entities to carry out its responsibilities related to permitting and other regulatory activities.

Proposed Technical Adjustments

Technical adjustments refer to unique or technical adjustments to the base program, for example transfers of base resources between budget lines.

Account	Line Office	PPA	OAR Consolidate Climate Research	NWS Dissemination Transfer	NESDIS Transfer of NIC to NWS	NESDIS Transfer of CRSRA and OSC to DOC	NESDIS Transfer of ICSDA Activities to OAR	NESDIS Proposed Budget Restructure	NESDIS Operational Phase Transfer - PWS to OSPO for JPSS	NESDIS Operational Phase Transfer LE0 to OSPO for Metop-C	OMAO Unmanned Systems Transfer	Payment to the DOC Working Capital Fund	Total PPA Technical ATB
ORF	OAR		Climate Laboratories and Cooperative Institutes										14,282
ORF	OAR		Climate Competitive Research										(19,958)
ORF	OAR		US Weather Research Program (USWRP)				2,680						8,356
ORF	NWS		Observations		1,520								1,520
ORF	NWS		Central Processing		90								90
ORF	NWS		Analyze, Forecast and Support		1,331								1,331
ORF	NWS		Dissemination	25,000									25,000
ORF	NESDIS		Office of Satellite and Product Operations		(2,941)			21,925	20,000	2,500			41,484
ORF	NESDIS		Product Development, Readiness & Application				(2,680)						2,680
ORF	NESDIS		Commercial Remote Sensing Regulatory Affairs			(1,800)							(1,800)
ORF	NESDIS		Office of Space Commerce			(1,800)							(1,800)
ORF	MS		Payment to the DOC Working Capital Fund									6,127	6,127
ORF	OMAO		Aviation Operations and Aircraft Services								(665)		(665)
ORF	OMAO		Unmanned Systems Operations								665		665
PAC	NWS		Dissemination	(25,000)									(25,000)
PAC	NESDIS		Joint Polar Satellite System					(548,035)					(548,035)
PAC	NESDIS		Polar Follow On					(329,956)					(329,956)
PAC	NESDIS		Polar Weather Satellites					877,991	(20,000)				857,991
PAC	NESDIS		COSMIC-2					(5,892)					(5,892)
PAC	NESDIS		Satellite Ground Services					(58,000)					(58,000)
PAC	NESDIS		System Architecture and Advanced Planning					(4,929)					(4,929)
PAC	NESDIS		Project, Planning and Analysis					(40,000)					(40,000)
PAC	NESDIS		Commercial Weather Data Pilot					(6,000)					(6,000)
PAC	NESDIS		Low Earth Orbit					37,123		(2,500)			34,623
PAC	NESDIS		Geostationary Orbit					25,219					25,219
PAC	NESDIS		Systems Architecture and Engineering					30,554					30,554
	Total		0	0	0	(3,600)	0	0	0	0	0	6,127	2,527

*The total PPS Technical ATB column aligns with the amounts for each PPA in the Technical ATBs column of the FY 2020 President’s Budget Control Table as reflected in the C.J.
 **Note that the FY 2020 Total ATBs column in the Blue Book Control Table includes both Calculated (Inflationary) ATBs and Technical ATBs so it includes the amounts in the table above but does not match these amounts for all PPAs.

National Ocean Service DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Navigation, Observations and Positioning					
Navigation, Observations and Positioning	156,467	2,321	158,788	(12,396)	146,392
Hydrographic Survey Priorities/Contracts	32,000	0	32,000	(5,051)	26,949
IOOS Regional Observations	38,500	0	38,500	(19,056)	19,444
Total, Navigation, Observations and Positioning	226,967	2,321	229,288	(36,503)	192,785
Coastal Science and Assessment					
Coastal Science, Assessment, Response and Restoration	77,500	1,153	78,653	(24,255)	54,398
Competitive Research	18,000	0	18,000	(18,000)	0
Total, Coastal Science and Assessment	95,500	1,153	96,653	(42,255)	54,398
Ocean and Coastal Management and Services					
Coastal Zone Management and Services	43,500	539	44,039	937	44,976
Coastal Management Grants	75,500	0	75,500	(75,500)	0
Title IX Fund	30,000	0	30,000	(30,000)	0
Coral Reef Program	27,600	79	27,679	(1,572)	26,107
National Estuarine Research Reserve System	27,000	0	27,000	(27,000)	0
Sanctuaries and Marine Protected Areas	55,500	779	56,279	(4,840)	51,439
Total, Ocean and Coastal Management and Services	259,100	1,397	260,497	(137,975)	122,522
Total, NOS - Discretionary ORF	581,567	4,871	586,438	(216,733)	369,705
Total, NOS - Discretionary PAC	3,900	0	3,900	(2,359)	1,541
Total, NOS - Other Discretionary Accounts	0	0	0	0	0
Discretionary Total - NOS	585,467	4,871	590,338	(219,092)	371,246
Total, NOS - Mandatory Accounts	30,965	(10,660)	20,305	0	20,305
GRAND TOTAL NOS	616,432	(5,789)	610,643	(219,092)	391,551

National Marine Fisheries Service DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Protected Resources Science and Management					
Marine Mammals, Sea Turtles, and Other Species	118,348	1,760	120,108	(7,599)	112,509
Species Recovery Grants	7,000	5	7,005	(1,009)	5,996
Atlantic Salmon	6,500	85	6,585	(315)	6,270
Pacific Salmon	65,000	1,314	66,314	(4,573)	61,741
Total, Protected Resources Science and Management	196,848	3,164	200,012	(13,496)	186,516
Fisheries Science and Management					
Fisheries and Ecosystem Science Programs and Services	147,107	2,304	149,411	(13,818)	135,593
Fisheries Data Collections, Surveys, and Assessments	168,086	1,866	169,952	(12,296)	157,656
Observers and Training	53,955	475	54,430	(10,383)	44,047
Fisheries Management Programs and Services	121,116	1,757	122,873	(9,220)	113,653
Aquaculture	15,000	123	15,123	(2,118)	13,005
Salmon Management Activities	37,000	118	37,118	(5,520)	31,598
Regional Councils and Fisheries Commissions	40,175	1,280	41,455	(3,802)	37,653
Interjurisdictional Fisheries Grants	3,365	0	3,365	(3,365)	0
Total, Fisheries Science and Management	585,804	7,923	593,727	(60,522)	533,205
Enforcement					
Enforcement	69,796	962	70,758	(16,686)	54,072
Total, Enforcement	69,796	962	70,758	(16,686)	54,072
Habitat Conservation and Restoration					
Habitat Conservation and Restoration	56,384	741	57,125	(19,250)	37,875
Subtotal, Habitat Conservation & Restoration	56,384	741	57,125	(19,250)	37,875
Total, NMFS - Discretionary ORF	908,832	12,790	921,622	(109,954)	811,668
Total, NMFS - Discretionary PAC	0	0	0	0	0
Total, NMFS - Other Discretionary Accounts	80,349	0	80,349	(80,000)	349
Discretionary Total - NMFS	989,181	12,790	1,001,971	(189,954)	812,017
Total, NMFS - Mandatory Accounts	38,267	(7,614)	30,653	0	30,653
GRAND TOTAL NMFS	1,027,448	5,176	1,032,624	(189,954)	842,670

Office of Oceanic and Atmospheric Research DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Climate Research					
Laboratories & Cooperative Institutes	61,000	15,401	76,401	(2,438)	73,963
Regional Climate Data & Information	38,000	51	38,051	(24,505)	13,546
Climate Competitive Research	60,000	(19,952)	40,048	(40,048)	0
Total, Climate Research	159,000	(4,500)	154,500	(66,991)	87,509
Weather & Air Chemistry Research					
Laboratories & Cooperative Institutes					
Laboratories & Cooperative Institutes	85,758	900	86,658	(19,968)	66,690
Subtotal, Laboratories & Cooperative Institutes	85,758	900	86,658	(19,968)	66,690
Weather & Air Chemistry Research Programs					
U.S. Weather Research Program (USWRP)	17,000	8,380	25,380	2,857	28,237
Tornado Severe Storm Research / Phased Array Radar	12,622	12	12,634	0	12,634
Joint Technology Transfer Initiative	20,000	4	20,004	(17,000)	3,004
Subtotal, Weather & Air Chemistry Research Programs	49,622	8,396	58,018	(14,143)	43,875
Total, Weather & Air Chemistry Research	135,380	9,296	144,676	(34,111)	110,565
Ocean, Coastal, and Great Lakes Research					
Laboratories & Cooperative Institutes					
Laboratories & Cooperative Institutes	36,000	467	36,467	(7,474)	28,993
Subtotal, Laboratories & Cooperative Institutes	36,000	467	36,467	(7,474)	28,993
National Sea Grant College Program					
National Sea Grant College Program Base	68,000	67	68,067	(68,067)	0
Marine Aquaculture Program	12,000	4	12,004	(12,004)	0
Subtotal, National Sea Grant College Program	80,000	71	80,071	(80,071)	0
Ocean Exploration and Research	42,000	87	42,087	(22,449)	19,638
Integrated Ocean Acidification	12,000	63	12,063	(3,994)	8,069

continues to next page

Office of Oceanic and Atmospheric Research (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Sustained Ocean Observations and Monitoring	43,000	147	43,147	(6,007)	37,140
Oceanographic Research Partnership Program	5,500	0	5,500	(5,500)	0
National Oceanographic Partnership Program	0	0	0	5,000	5,000
Total, Ocean, Coastal, & Great Lakes Research	218,500	835	219,335	(120,495)	98,840
Innovative Research & Technology					
High Performance Computing Initiatives	12,180	55	12,235	0	12,235
Total, Innovative Research & Technology	12,180	55	12,235	0	12,235
Total, OAR - Discretionary ORF	525,060	5,686	530,746	(221,597)	309,149
Total, OAR - Discretionary PAC	41,000	0	41,000	(15,000)	26,000
Total, OAR - Other Discretionary Accounts	0	0	0	0	0
Discretionary Total - OAR	566,060	5,686	571,746	(236,597)	335,149

National Weather Service DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Observations	224,363	4,358	228,721	(17,022)	211,699
Central Processing	97,890	1,203	99,093	(12,229)	86,864
Analyze, Forecast and Support	505,438	12,783	518,221	(35,185)	483,036
Dissemination	50,028	25,454	75,482	(389)	75,093
Science and Technology Integration	143,000	2,129	145,129	(12,523)	132,606
Total, NWS - Discretionary ORF	1,020,719	45,927	1,066,646	(77,348)	989,298
Total, NWS - Discretionary PAC	141,890	(25,000)	116,890	(24,314)	92,576
Total, NWS - Other Discretionary Accounts	0	0	0	0	0
Discretionary Total - NWS	1,162,609	20,927	1,183,536	(101,662)	1,081,874

National Environmental Satellite Data and Information Service

DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Environmental Satellite Observing Systems					
Office of Satellite and Product Operations (OSPO)					
Office of Satellite and Product Operations	146,924	43,084	190,008	(3,218)	186,790
Subtotal, Office of Satellite and Product Operations (OSPO)	146,924	43,084	190,008	(3,218)	186,790
Product Development, Readiness & Application					
Product Development, Readiness & Application	31,000	(2,566)	28,434	(702)	27,732
Subtotal, Product Development, Readiness & Application	31,000	(2,566)	28,434	(702)	27,732
Commercial Remote Sensing Regulatory Affairs	1,800	(1,800)	0	0	0
Office of Space Commerce	1,800	(1,800)	0	0	0
Group on Earth Observations (GEO)	500	0	500	0	500
Total, Environmental Satellite Observing Systems	182,024	36,918	218,942	(3,920)	215,022
National Centers for Environmental Information					
National Centers for Environmental Information	60,642	571	61,213	(4,643)	56,570
Total, National Centers for Environmental Information	60,642	571	61,213	(4,643)	56,570
Total, NESDIS - Discretionary ORF	242,666	37,489	280,155	(8,563)	271,592
Total, NESDIS - Discretionary PAC	1,455,879	(44,425)	1,411,454	(210,335)	1,201,119
Total, NESDIS - Other Discretionary Accounts	0	0	0	0	0
Discretionary Total - NESDIS	1,698,545	(6,936)	1,691,609	(218,898)	1,472,711

Mission Support DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Executive Leadership	27,078	488	27,566	739	28,305
Mission Services and Management	148,000	2,452	150,452	4,260	154,712
IT Security	10,050	57	10,107	4,972	15,079
Payment to the DOC Working Capital Fund	53,585	8,485	62,070	0	62,070
Office of Education	28,500	45	28,545	(27,506)	1,039
Total, MS - Discretionary ORF	267,213	11,527	278,740	(17,535)	261,205
Total, MS - Discretionary PAC	25,000	0	25,000	(20,002)	4,998
Total, MS - Other Discretionary Accounts	0	0	0	0	0
Discretionary Total - MS	292,213	11,527	303,740	(37,537)	266,203

Office of Marine and Aviation Operations DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Marine Operations and Maintenance	190,670	3,553	194,223	(1,801)	192,422
Aviation Operations and Aircraft Services	35,750	(38)	35,712	(1,126)	34,586
Unmanned System Operations	0	665	665	4,000	4,665
Total, OMAO - Discretionary ORF	226,420	4,180	230,600	1,073	231,673
Total, OMAO - Discretionary PAC	99,378	0	99,378	(7,678)	91,700
Total, OMAO - Other Discretionary Accounts	1,449	48	1,497	0	1,497
Discretionary Total - OMAO	327,247	4,228	331,475	(6,605)	324,870
Total, OMAO - Mandatory Accounts	30,075	0	30,075	0	30,075
GRAND TOTAL OMAO	357,322	4,228	361,550	(6,605)	354,945

LO Direct Discretionary ORF Obligations DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
National Ocean Service	581,567	4,871	586,438	(216,733)	369,705
National Marine Fisheries Service	908,832	12,790	921,622	(109,954)	811,668
Office of Oceanic and Atmospheric Research	525,060	5,686	530,746	(221,597)	309,149
National Weather Service	1,020,719	45,927	1,066,646	(77,348)	989,298
National Environmental Satellite, Data and Information Service	242,666	37,489	280,155	(8,563)	271,592
Mission Support	267,213	11,527	278,740	(17,535)	261,205
Office of Marine and Aviation Operations	226,420	4,180	230,600	1,073	231,673
SUBTOTAL LO DIRECT DISCRETIONARY ORF OBLIGATIONS	3,772,477	122,470	3,894,947	(650,657)	3,244,290

ORF Adjustments DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
SUBTOTAL ORF DIRECT OBLIGATIONS	3,772,477	122,470	3,894,947	(650,657)	3,244,290
FINANCING					
Deobligations	(17,500)	(10,000)	(27,500)	0	(27,500)
Total ORF Financing	(17,500)	(10,000)	(27,500)	0	(27,500)
SUBTOTAL ORF BUDGET AUTHORITY	3,754,977	112,470	3,867,447	(650,657)	3,216,790
TRANSFERS					
Transfer from P&D to ORF	(157,980)	(427)	(158,407)	0	(158,407)
Total ORF Transfers	(157,980)	(427)	(158,407)	0	(158,407)
SUBTOTAL ORF APPROPRIATION	3,596,997	112,043	3,709,040	(650,657)	3,058,383

Procurement, Acquisition, and Construction DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
NOS					
Construction					
National Estuarine Research Reserve Construction (NERRS)	1,900	0	1,900	(1,900)	0
Marine Sanctuaries Construction Base	2,000	0	2,000	(459)	1,541
Subtotal, NOS Construction	3,900	0	3,900	(2,359)	1,541
Total, NOS - PAC	3,900	0	3,900	(2,359)	1,541
Total, NMFS - PAC	0	0	0	0	0
OAR					
Systems Acquisition					
Research Supercomputing/ CCRI	41,000	0	41,000	(15,000)	26,000
Subtotal, OAR Systems Acquisition	41,000	0	41,000	(15,000)	26,000
Total, OAR - PAC	41,000	0	41,000	(15,000)	26,000
NWS					
Systems Acquisition					
Observations	21,129	0	21,129	(4,879)	16,250
Central Processing	66,761	0	66,761	(8,622)	58,139
Dissemination	35,000	(25,000)	10,000	(447)	9,553
Subtotal, NWS Systems Acquisition	122,890	(25,000)	97,890	(13,948)	83,942
Construction					
Facilities Construction and Major Repairs	19,000	0	19,000	(10,366)	8,634
Subtotal, NWS Construction	19,000	0	19,000	(10,366)	8,634
Total, NWS - PAC	141,890	(25,000)	116,890	(24,314)	92,576

continues to next page

Procurement, Acquisition, and Construction (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
NESDIS					
Systems Acquisition					
Geostationary Systems - R	408,380	0	408,380	(104,324)	304,056
Joint Polar Satellite System (JPSS)	548,035	(548,035)	0	0	0
Polar Follow On	329,956	(329,956)	0	0	0
Polar Weather Satellites	0	857,991	857,991	(102,953)	755,038
Cooperative Data and Rescue Services (CDARS)	26,539	0	26,539	(11,689)	14,850
Space Weather Follow On	27,000	0	27,000	(1,400)	25,600
COSMIC 2/GNSS RO	5,892	(5,892)	0	0	0
Satellite Ground Services	58,000	(58,000)	0	0	0
System Architecture and Advanced Planning	4,929	(4,929)	0	0	0
Projects, Planning and Analysis	40,000	(40,000)	0	0	0
Commercial Weather Data Pilot	6,000	(6,000)	0	0	0
Low Earth Orbit (LEO)	0	34,623	34,623	(1,421)	33,202
Geostationary Earth Orbit (GEO)	0	25,219	25,219	(2,816)	22,403
Systems Architecture and Engineering (SAE)	0	30,554	30,554	14,268	44,822
Subtotal, NESDIS Systems Acquisition	1,454,731	(44,425)	1,410,306	(210,335)	1,199,971
Construction					
Satellite CDA Facility	2,450	0	2,450	0	2,450
Subtotal, NESDIS Construction	2,450	0	2,450	0	2,450
Transfer to OIG	(1,302)	0	(1,302)	0	(1,302)
Total, NESDIS - PAC	1,455,879	(44,425)	1,411,454	(210,335)	1,201,119

continues to next page

Procurement, Acquisition, and Construction (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Mission Support					
Construction					
NOAA Construction	25,000	0	25,000	(20,002)	4,998
Subtotal, Mission Support Construction	25,000	0	25,000	(20,002)	4,998
Total, Mission Support - PAC	25,000	0	25,000	(20,002)	4,998
OMAO					
Marine and Aviation Capital Investments					
Platform Capital Improvements & Tech Infusion	24,378	0	24,378	(7,678)	16,700
Vessel Recapitalization	75,000	0	75,000	0	75,000
Aircraft Recapitalization	0	0	0	0	0
Subtotal, Marine and Aviation Capital Investments	99,378	0	99,378	(7,678)	91,700
Total, OMAO - PAC	99,378	0	99,378	(7,678)	91,700
GRAND TOTAL PAC DISCRETIONARY OBLIGATIONS	1,767,047	(69,425)	1,697,622	(279,688)	1,417,934

PAC Adjustments DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
SUBTOTAL PAC DIRECT OBLIGATIONS	1,767,047	(69,425)	1,697,622	(279,688)	1,417,934
FINANCING					
Deobligations	(13,000)	0	(13,000)	0	(13,000)
Total PAC Financing	(13,000)	0	(13,000)	0	(13,000)
SUBTOTAL PAC BUDGET AUTHORITY	1,754,047	(69,425)	1,684,622	(279,688)	1,404,934
TRANSFERS					
Transfer to OIG	1,302	0	1,302	0	1,302
Total PAC Transfers	1,302	0	1,302	0	1,302
SUBTOTAL PAC APPROPRIATION	1,755,349	(69,425)	1,685,924	(279,688)	1,406,236

Other Accounts Discretionary DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
NMFS					
Fishermen's Contingency Fund Obligations	349	0	349	0	349
Fishermen's Contingency Fund Budget Authority	349	0	349	0	349
Fishermen's Contingency Fund Appropriations	349	0	349	0	349
Foreign Fishing Observer Fund Obligations	0	0	0	0	0
Foreign Fishing Observer Fund Budget Authority	0	0	0	0	0
Foreign Fishing Observer Fund Appropriation	0	0	0	0	0
Fisheries Finance Program Account Obligations	0	0	0	0	0
Fisheries Finance Program Account Budget Authority	0	0	0	0	0
Fisheries Finance Program Account Appropriation	0	0	0	0	0
Promote and Develop Fisheries Obligations	0	0	0	0	0
Promote and Develop Fisheries Budget Authority	(157,980)	(427)	(158,407)	0	(158,407)
Promote and Develop Fisheries Appropriation	0	0	0	0	0
Pacific Coastal Salmon Recovery Fund Obligations	65,000	0	65,000	(65,000)	0
Pacific Coastal Salmon Recovery Fund Budget Authority	65,000	0	65,000	(65,000)	0
Pacific Coastal Salmon Recovery Fund Appropriation	65,000	0	65,000	(65,000)	0
Marine Mammal Unusual Mortality Event Fund Obligations	0	0	0	0	0
Marine Mammal Unusual Mortality Event Fund Budget Authority	0	0	0	0	0
Marine Mammal Unusual Mortality Event Fund Appropriation	0	0	0	0	0
Fisheries Disaster Assistance Fund Obligations	15,000	0	15,000	(15,000)	0
Fisheries Disaster Assistance Fund Budget Authority	15,000	0	15,000	(15,000)	0
Fisheries Disaster Assistance Fund Appropriation	15,000	0	15,000	(15,000)	0
Subtotal, NMFS Other Discretionary Direct Obligations	80,349	0	80,349	(80,000)	349
Subtotal, NMFS Other Discretionary Budget Authority	(77,631)	(427)	(78,058)	(80,000)	(158,058)
Subtotal, NMFS Other Discretionary Appropriation	80,349	0	80,349	(80,000)	349

continues to next page

Other Accounts Discretionary (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
OMAO					
Medicare Eligible Retiree Healthcare Fund Obligations	1,449	48	1,497	0	1,497
Medicare Eligible Retiree Healthcare Fund Budget Authority	1,603	(106)	1,497	0	1,497
Medicare Eligible Retiree Healthcare Fund Appropriation	1,603	(106)	1,497	0	1,497
Subtotal, OMAO Other Discretionary Direct Obligations	1,449	48	1,497	0	1,497
Subtotal, OMAO Other Discretionary Budget Authority	1,603	(106)	1,497	0	1,497
Subtotal, OMAO Other Discretionary Appropriation	1,603	(106)	1,497	0	1,497
TOTAL, OTHER DISCRETIONARY DIRECT OBLIGATIONS	81,798	48	81,846	(80,000)	1,846
TOTAL, OTHER DISCRETIONARY BUDGET AUTHORITY	(76,028)	(533)	(76,561)	(80,000)	(156,561)
TOTAL, OTHER DISCRETIONARY APPROPRIATION	81,952	(106)	81,846	(80,000)	1,846

Summary of Discretionary Resources DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Direct Discretionary Obligations					
ORF Direct Obligations	3,772,477	122,470	3,894,947	(650,657)	3,244,290
PAC Direct Obligations	1,767,047	(69,425)	1,697,622	(279,688)	1,417,934
OTHER Direct Obligations	81,798	48	81,846	(80,000)	1,846
TOTAL Direct Discretionary Obligations	5,621,322	53,093	5,674,415	(1,010,345)	4,664,070
Discretionary Budget Authority					
ORF Budget Authority	3,754,977	112,470	3,867,447	(650,657)	3,216,790
PAC Budget Authority	1,754,047	(69,425)	1,684,622	(279,688)	1,404,934
OTHER Budget Authority	(76,028)	(533)	(76,561)	(80,000)	(156,561)
TOTAL Discretionary Budget Authority	5,432,996	42,512	5,475,508	(1,010,345)	4,465,163
Discretionary Appropriations					
ORF Appropriation	3,596,997	112,043	3,709,040	(650,657)	3,058,383
PAC Appropriation	1,755,349	(69,425)	1,685,924	(279,688)	1,406,236
OTHER Appropriation	81,952	(106)	81,846	(80,000)	1,846
TOTAL Discretionary Appropriation	5,434,298	42,512	5,476,810	(1,010,345)	4,466,465

Grand Total Summary Discretionary Appropriations DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Operations, Research, and Facilities	3,596,997	112,043	3,709,040	(650,657)	3,058,383
Procurement, Acquisition, and Construction	1,755,349	(69,425)	1,685,924	(279,688)	1,406,236
Fisherman's Contingency Fund	349	0	349	0	349
Fisheries Finance Program Account	0	0	0	0	0
Pacific Coastal Salmon Recovery Fund	65,000	0	65,000	(65,000)	0
Fisheries Disaster Assistance Fund	15,000	0	15,000	(15,000)	0
Marine Mammal Unusual Mortality Event Fund	0	0	0	0	0
Medicare Eligible Retiree Health Care Fund	1,603	(106)	1,497	0	1,497
GRAND TOTAL DISCRETIONARY APPROPRIATION	5,434,298	42,512	5,476,810	(1,010,345)	4,466,465

Other Accounts Mandatory DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
NOS					
Damage Assessment and Restoration Revolving Fund Obligations	24,960	(8,992)	15,968	0	15,968
Damage Assessment and Restoration Revolving Fund Budget Authority	5,992	(24)	5,968	0	5,968
Damage Assessment and Restoration Revolving Fund Appropriation	0	0	0	0	0
Sanctuaries Enforcement Asset Forfeiture Fund Obligations	120	0	120	0	120
Sanctuaries Enforcement Asset Forfeiture Fund Budget Authority	120	0	120	0	120
Sanctuaries Enforcement Asset Forfeiture Fund Appropriation	120	0	120	0	120
Gulf Coast Ecosystem Restoration Fund Obligations	5,885	(1,668)	4,217	0	4,217
Gulf Coast Ecosystem Restoration Fund Budget Authority	0	0	0	0	0
Gulf Coast Ecosystem Restoration Fund Appropriation	0	0	0	0	0
Subtotal, NOS Other Mandatory Direct Obligations	30,965	(10,660)	20,305	0	20,305
Subtotal, NOS Other Mandatory Budget Authority	6,112	(24)	6,088	0	6,088
Subtotal, NOS Other Mandatory Appropriation	120	0	120	0	120
NMFS					
Promote and Develop Fisheries Obligations	426	(426)	0	0	0
Promote and Develop Fisheries Budget Authority	158,406	1	158,407	0	158,407
Promote and Develop Fisheries Appropriation	0	0	0	0	0
Fisheries Finance Program Account Obligations	8,083	(8,083)	0	0	0
Fisheries Finance Program Account Budget Authority	8,083	(8,083)	0	0	0
Fisheries Finance Program Account Appropriation	8,083	(8,083)	0	0	0
Federal Ship Financing Fund Obligations	0	0	0	0	0
Federal Ship Financing Fund Budget Authority	0	0	0	0	0
Federal Ship Financing Fund Appropriation	0	0	0	0	0

continues to next page

Other Accounts Mandatory (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Environmental Improvement & Restoration Fund Obligations	6,563	686	7,249	0	7,249
Environmental Improvement & Restoration Fund Budget Authority	6,563	686	7,249	0	7,249
Environmental Improvement & Restoration Fund Appropriation	6,997	731	7,728	0	7,728
Limited Access System Administration Fund Obligations	14,741	246	14,987	0	14,987
Limited Access System Administration Fund Budget Authority	14,741	246	14,987	0	14,987
Limited Access System Administration Fund Appropriation	14,831	166	14,997	0	14,997
Western Pacific Sustainable Fisheries Fund Obligations	596	4	600	0	600
Western Pacific Sustainable Fisheries Fund Budget Authority	596	4	600	0	600
Western Pacific Sustainable Fisheries Fund Appropriation	600	0	600	0	600
Fisheries Enforcement Asset Forfeiture Fund Obligations	3,844	(27)	3,817	0	3,817
Fisheries Enforcement Asset Forfeiture Fund Budget Authority	3,844	(27)	3,817	0	3,817
Fisheries Enforcement Asset Forfeiture Fund Appropriation	3,817	0	3,817	0	3,817
North Pacific Observer Fund Obligations	4,014	(14)	4,000	0	4,000
North Pacific Observer Fund Budget Authority	4,014	(14)	4,000	0	4,000
North Pacific Observer Fund Appropriation	4,000	0	4,000	0	4,000
Subtotal, NMFS Other Mandatory Direct Obligations	38,267	(7,614)	30,653	0	30,653
Subtotal, NMFS Other Mandatory Budget Authority	196,247	(7,187)	189,060	0	189,060
Subtotal, NMFS Other Mandatory Appropriation	38,328	(7,186)	31,142	0	31,142
OMAO					
NOAA Corps Commissioned Officers Retirement Obligations	30,075	0	30,075	0	30,075
NOAA Corps Commissioned Officers Retirement Budget Authority	30,075	0	30,075	0	30,075
NOAA Corps Commissioned Officers Retirement Appropriation	30,075	0	30,075	0	30,075
Subtotal, OMAO Other Mandatory Direct Obligations	30,075	0	30,075	0	30,075
Subtotal, OMAO Other Mandatory Budget Authority	30,075	0	30,075	0	30,075
Subtotal, OMAO Other Mandatory Appropriation	30,075	0	30,075	0	30,075

continues to next page

Other Accounts Mandatory (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
TOTAL, OTHER MANDATORY DIRECT OBLIGATIONS	99,307	(18,274)	81,033	0	81,033
TOTAL, OTHER MANDATORY BUDGET AUTHORITY	232,434	(7,211)	225,223	0	225,223
TOTAL, OTHER MANDATORY APPROPRIATION	68,523	(7,186)	61,337	0	61,337

NOAA Summary DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
TOTAL Direct Obligations (Discretionary & Mandatory)	5,720,629	34,819	5,755,448	(1,010,345)	4,745,103
TOTAL Budget Authority (Discretionary & Mandatory)	5,665,430	35,301	5,700,731	(1,010,345)	4,690,386
TOTAL Appropriation (Discretionary & Mandatory)	5,502,821	35,326	5,538,147	(1,010,345)	4,527,802
Reimbursable Financing	242,000	0	242,000	0	242,000
TOTAL OBLIGATIONS (Direct & Reimbursable)	5,962,629	34,819	5,997,448	(1,010,345)	4,987,103
Offsetting Receipts	(2,579)	(5,168)	(7,747)	0	(7,747)
TOTAL OBLIGATIONS (Direct, Reimbursable & Offsetting Receipts)	5,960,050	29,651	5,989,701	(1,010,345)	4,979,356

Line Office Summary DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
National Ocean Service					
ORF	581,567	4,871	586,438	(216,733)	369,705
PAC	3,900	0	3,900	(2,359)	1,541
OTHER	30,965	(10,660)	20,305	0	20,305
TOTAL, NOS	616,432	(5,789)	610,643	(219,092)	391,551
National Marine Fisheries Service					
ORF	908,832	12,790	921,622	(109,954)	811,668
PAC	0	0	0	0	0
OTHER	118,616	(7,614)	111,002	(80,000)	31,002
TOTAL, NMFS	1,027,448	5,176	1,032,624	(189,954)	842,670
Oceanic and Atmospheric Research					
ORF	525,060	5,686	530,746	(221,597)	309,149
PAC	41,000	0	41,000	(15,000)	26,000
TOTAL, OAR	566,060	5,686	571,746	(236,597)	335,149
National Weather Service					
ORF	1,020,719	45,927	1,066,646	(77,348)	989,298
PAC	141,890	(25,000)	116,890	(24,314)	92,576
TOTAL, NWS	1,162,609	20,927	1,183,536	(101,662)	1,081,874
National Environmental Satellite, Data and Information Service					
ORF	242,666	37,489	280,155	(8,563)	271,592
PAC	1,455,879	(44,425)	1,411,454	(210,335)	1,201,119
TOTAL, NESDIS	1,698,545	(6,936)	1,691,609	(218,898)	1,472,711

Line Office Summary (cont'd) DOLLARS IN THOUSANDS

FY 2020 Proposed Operating Plan	FY 2019 Enacted	Total FY 2020 ATBs	FY 2020 Base	FY 2020 Program Changes	FY 2020 Estimate
Mission Support					
ORF	267,213	11,527	278,740	(17,535)	261,205
PAC	25,000	0	25,000	(20,002)	4,998
OTHER	0	0	0	0	0
SUBTOTAL, Mission Support	292,213	11,527	303,740	(37,537)	266,203
Office of Marine and Aviation Operations					
ORF	226,420	4,180	230,600	1,073	231,673
PAC	99,378	0	99,378	(7,678)	91,700
OTHER	31,524	48	31,572	0	31,572
TOTAL, OMAO	357,322	4,228	361,550	(6,605)	354,945
DIRECT DISCRETIONARY OBLIGATIONS					
ORF	3,772,477	122,470	3,894,947	(650,657)	3,244,290
PAC	1,767,047	(69,425)	1,697,622	(279,688)	1,417,934
OTHER	181,105	(18,226)	162,879	(80,000)	82,879
TOTAL, DIRECT DISCRETIONARY OBLIGATIONS	5,720,629	34,819	5,755,448	(1,010,345)	4,745,103
ORF Adjustments (Deobligations/Rescissions)	(17,500)	(10,000)	(27,500)	0	(27,500)
ORF Transfers	(157,980)	(427)	(158,407)	0	(158,407)
PAC Adjustments (Deobligations/Rescissions)	(13,000)	0	(13,000)	0	(13,000)
PAC Transfers	1,302	0	1,302	0	1,302
OTHER Discretionary Adjustments	154	(154)	0	0	0
Mandatory Accounts Excluded	(99,307)	18,274	(81,033)	0	(81,033)
TOTAL, DISCRETIONARY APPROPRIATIONS	5,434,298	42,512	5,476,810	(1,010,345)	4,466,465