

# WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2015

MAY 19, 2015.—Committed to the Committee of the Whole House on the State of  
the Union and ordered to be printed

Mr. SMITH of Texas, from the Committee on Science, Space, and  
Technology, submitted the following

## R E P O R T

[To accompany H.R. 1561]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 1561) to improve the National Oceanic and Atmospheric Administration’s weather research through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events, to expand commercial opportunities for the provision of weather data, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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The amendment is as follows:

Strike all after the enacting clause and insert the following:

**SECTION 1. SHORT TITLE.**

This Act may be cited as the “Weather Research and Forecasting Innovation Act of 2015”.

**SEC. 2. PUBLIC SAFETY PRIORITY.**

In accordance with NOAA’s critical mission to provide science, service, and stewardship, the Under Secretary shall prioritize weather research, across all weather programs, to improve weather data, forecasts, and warnings for the protection of life and property and the enhancement of the national economy.

**SEC. 3. WEATHER RESEARCH AND FORECASTING INNOVATION.**

(a) **PROGRAM.**—The Assistant Administrator for OAR shall conduct a program to develop improved understanding of and forecast capabilities for atmospheric events and their impacts, placing priority on developing more accurate, timely, and effective warnings and forecasts of high impact weather events that endanger life and property.

(b) **PROGRAM ELEMENTS.**—The program described in subsection (a) shall focus on the following activities:

(1) Improving the fundamental understanding of weather consistent with section 2, including the boundary layer and other atmospheric processes affecting high impact weather events.

(2) Improving the understanding of how the public receives, interprets, and responds to warnings and forecasts of high impact weather events that endanger life and property.

(3) Research and development, and transfer of knowledge, technologies, and applications to the NWS and other appropriate agencies and entities, including the American weather industry and academic partners, related to—

(A) advanced radar, radar networking technologies, and other ground-based technologies, including those emphasizing rapid, fine-scale sensing of the boundary layer and lower troposphere, and the use of innovative, dual-polarization, phased array technologies;

(B) aerial weather observing systems;

(C) high performance computing and information technology and wireless communication networks;

(D) advanced numerical weather prediction systems and forecasting tools and techniques that improve the forecasting of timing, track, intensity, and severity of high impact weather, including through—

(i) the development of more effective mesoscale models;

(ii) more effective use of existing, and the development of new, regional and national cloud-resolving models;

(iii) enhanced global weather models; and

(iv) integrated assessment models;

(E) quantitative assessment tools for measuring the impact and value of data and observing systems, including OSSEs (as described in section 8), OSEs, and AOAs;

(F) atmospheric chemistry and interactions essential to accurately characterizing atmospheric composition and predicting meteorological processes, including cloud microphysical, precipitation, and atmospheric electrification processes, to more effectively understand their role in severe weather; and

(G) additional sources of weather data and information, including commercial observing systems.

(4) A technology transfer initiative, carried out jointly and in coordination with the Assistant Administrator for NWS, and in cooperation with the American weather industry and academic partners, to ensure continuous development and transition of the latest scientific and technological advances into NWS operations and to establish a process to sunset outdated and expensive operational methods and tools to enable cost-effective transfer of new methods and tools into operations.

(c) **EXTRAMURAL RESEARCH.**—

(1) **IN GENERAL.**—In carrying out the program under this section, the Assistant Administrator for OAR shall collaborate with and support the non-Federal weather research community, which includes institutions of higher education, private entities, and nongovernmental organizations, by making funds available through competitive grants, contracts, and cooperative agreements.

(2) SENSE OF CONGRESS.—It is the sense of Congress that not less than 30 percent of the funds for weather research and development at OAR should be made available for the purpose described in paragraph (1).

(d) REPORT.—The Under Secretary shall transmit to Congress annually, concurrently with NOAA's budget request, a description of current and planned activities under this section.

#### **SEC. 4. TORNADO WARNING IMPROVEMENT AND EXTENSION PROGRAM.**

(a) IN GENERAL.—The Under Secretary, in collaboration with the American weather industry and academic partners, shall establish a tornado warning improvement and extension program.

(b) GOAL.—The goal of such program shall be to reduce the loss of life and economic losses from tornadoes through the development and extension of accurate, effective, and timely tornado forecasts, predictions, and warnings, including the prediction of tornadoes beyond one hour in advance.

(c) PROGRAM PLAN.—Not later than 6 months after the date of enactment of this Act, the Assistant Administrator for OAR, in coordination with the Assistant Administrator for NWS, shall develop a program plan that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the program goal.

(d) BUDGET FOR PLAN.—Following completion of the plan, the Assistant Administrator for OAR, in coordination with the Assistant Administrator for NWS, shall transmit annually to Congress a proposed budget corresponding to the activities identified in the plan.

#### **SEC. 5. HURRICANE FORECAST IMPROVEMENT PROGRAM.**

(a) IN GENERAL.—The Under Secretary, in collaboration with the American weather industry and academic partners, shall maintain the Hurricane Forecast Improvement Program (HFIP).

(b) GOAL.—The goal of such program shall be to develop and extend accurate hurricane forecasts and warnings in order to reduce loss of life, injury, and damage to the economy.

(c) PROGRAM PLAN.—Not later than 6 months after the date of enactment of this Act, the Assistant Administrator for OAR, in consultation with the Assistant Administrator for NWS, shall develop a program plan that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the program goal.

(d) BUDGET FOR PLAN.—Following completion of the plan, the Assistant Administrator for OAR, in consultation with the Assistant Administrator for NWS, shall transmit annually to Congress a proposed budget corresponding to the activities identified in the plan.

#### **SEC. 6. WEATHER RESEARCH AND DEVELOPMENT PLANNING.**

Not later than 6 months after the date of enactment of this Act, and annually thereafter, the Assistant Administrator for OAR, in coordination with the Assistant Administrators for NWS and NESDIS, shall issue a research and development and research to operations plan to restore and maintain United States leadership in numerical weather prediction and forecasting that—

(1) describes the forecasting skill and technology goals, objectives, and progress of NOAA in carrying out the program conducted under section 3;

(2) identifies and prioritizes specific research and development activities, and performance metrics, weighted to meet the operational weather mission of NWS to achieve a weather-ready Nation;

(3) describes how the program will collaborate with stakeholders, including the American weather industry and academic partners; and

(4) identifies, through consultation with the National Science Foundation, American weather industry, and academic partners, research necessary to enhance the integration of social science knowledge into weather forecast and warning processes, including to improve the communication of threat information necessary to enable improved severe weather planning and decisionmaking on the part of individuals and communities.

#### **SEC. 7. OBSERVING SYSTEM PLANNING.**

The Under Secretary shall—

(1) develop and maintain a prioritized list of observation data requirements necessary to ensure weather forecasting capabilities to protect life and property to the maximum extent practicable;

(2) undertake, using OSSEs, OSEs, AOAs, and other appropriate assessment tools, ongoing systematic evaluations of the combination of observing systems, data, and information needed to meet the requirements listed under paragraph

- (1), assessing various options to maximize observational capabilities and their cost-effectiveness;
- (3) identify current and potential future data gaps in observing capabilities related to the requirements listed under paragraph (1); and
- (4) determine a range of options to address gaps identified under paragraph (3).

#### **SEC. 8. OBSERVING SYSTEM SIMULATION EXPERIMENTS.**

(a) **IN GENERAL.**—In support of the requirements of section 7, the Assistant Administrator for OAR shall undertake OSSEs to quantitatively assess the relative value and benefits of observing capabilities and systems. Technical and scientific OSSE evaluations—

- (1) may include assessments of the impact of observing capabilities on—
  - (A) global weather prediction;
  - (B) hurricane track and intensity forecasting;
  - (C) tornado warning lead times and accuracy;
  - (D) prediction of mid-latitude severe local storm outbreaks; and
  - (E) prediction of storms that have the potential to cause extreme precipitation and flooding lasting from 6 hours to 1 week; and
- (2) shall be conducted in cooperation with other appropriate entities within NOAA, other Federal agencies, the American weather industry, and academic partners to ensure the technical and scientific merit of OSSE results.
- (b) **REQUIREMENTS.**—OSSEs shall quantitatively—
  - (1) determine the potential impact of proposed space-based, suborbital, and in situ observing systems on analyses and forecasts, including potential impacts on extreme weather events across all parts of the Nation;
  - (2) evaluate and compare observing system design options; and
  - (3) assess the relative capabilities and costs of various observing systems and combinations of observing systems in providing data necessary to protect life and property.
- (c) **IMPLEMENTATION.**—OSSEs—
  - (1) shall be conducted prior to the acquisition of major Government-owned or Government-leased operational observing systems, including polar-orbiting and geostationary satellite systems, with a lifecycle cost of more than \$500,000,000; and
  - (2) shall be conducted prior to the purchase of any major new commercially provided data with a lifecycle cost of more than \$500,000,000.
- (d) **PRIORITY OSSEs.**—
  - (1) **GLOBAL NAVIGATION SATELLITE SYSTEM RADIO OCCULTATION.**—Not later than December 31, 2015, the Assistant Administrator for OAR shall complete an OSSE to assess the value of data from Global Navigation Satellite System Radio Occultation.
  - (2) **GEOSTATIONARY HYPERSPECTRAL SOUNDER GLOBAL CONSTELLATION.**—Not later than December 31, 2016, the Assistant Administrator for OAR shall complete an OSSE to assess the value of data from a geostationary hyperspectral sounder global constellation.
- (e) **RESULTS.**—Upon completion of all OSSEs, results shall be publicly released and accompanied by an assessment of related private and public sector weather data sourcing options, including their availability, affordability, and cost effectiveness. Such assessments shall be developed in accordance with section 50503 of title 51, United States Code.

#### **SEC. 9. COMPUTING RESOURCES PRIORITIZATION REPORT.**

Not later than 12 months after the date of enactment of this Act, and annually thereafter, the NOAA Chief Information Officer, in coordination with the Assistant Administrator for OAR and the Assistant Administrator for NWS, shall produce and make publicly available a report that explains how NOAA intends to—

- (1) continually support upgrades to pursue the fastest, most powerful, and cost effective high performance computing technologies in support of its weather prediction mission;
- (2) ensure a balance between the research to operations requirements to develop the next generation of regional and global models as well as highly reliable operational models;
- (3) take advantage of advanced development concepts to, as appropriate, make next generation weather prediction models available in beta-test mode to operational forecasters, the American weather industry, and partners in academic and government research; and
- (4) use existing computing resources to improve advanced research and operational weather prediction.

**SEC. 10. COMMERCIAL WEATHER DATA.**

(a) **AMENDMENT.**—Section 60161 of title 51, United States Code, is amended by adding at the end the following: “This prohibition shall not extend to—

“(1) the purchase of weather data through contracts with commercial providers; or

“(2) the placement of weather satellite instruments on cohosted government or private payloads.”.

(b) **STRATEGY.**—

(1) **IN GENERAL.**—Not later than 6 months after the date of enactment of this Act, the Secretary of Commerce, in consultation with the Under Secretary, shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a strategy to enable the procurement of quality commercial weather data. The strategy shall assess the range of commercial opportunities, including public-private partnerships, for obtaining surface-based, aviation-based, and space-based weather observations. The strategy shall include the expected cost effectiveness of these opportunities as well as provide a plan for procuring data, including an expected implementation timeline, from these nongovernmental sources, as appropriate.

(2) **REQUIREMENTS.**—The strategy shall include—

(A) an analysis of financial or other benefits to, and risks associated with, acquiring commercial weather data or services, including through multiyear acquisition approaches;

(B) an identification of methods to address planning, programming, budgeting, and execution challenges to such approaches, including—

(i) how standards will be set to ensure that data is reliable and effective;

(ii) how data may be acquired through commercial experimental or innovative techniques and then evaluated for integration into operational use;

(iii) how to guarantee public access to all forecast-critical data to ensure that the American weather industry and the public continue to have access to information critical to their work; and

(iv) in accordance with section 50503 of title 51, United States Code, methods to address potential termination liability or cancellation costs associated with weather data or service contracts; and

(C) an identification of any changes needed in the requirements development and approval processes of the Department of Commerce to facilitate effective and efficient implementation of such strategy.

(3) **AUTHORITY FOR AGREEMENTS.**—The Assistant Administrator for NESDIS may enter into multiyear agreements necessary to carry out the strategy developed under this subsection.

(c) **PILOT PROGRAM.**—

(1) **CRITERIA.**—Not later than December 31, 2015, NOAA shall publish data standards and specifications for space-based commercial weather data.

(2) **PILOT CONTRACT.**—

(A) **CONTRACT.**—Not later than October 1, 2016, NOAA shall, through an open competition, enter into at least one pilot contract with a private sector entity capable of providing data that meet the standards and specifications set by NOAA to provide commercial weather data in a manner that allows NOAA to calibrate and evaluate the data.

(B) **ASSESSMENT OF DATA VIABILITY.**—Not later than October 1, 2019, NOAA shall transmit to Congress the results of a determination of the extent to which data provided under the contract entered into under subparagraph (A) meet the criteria published under paragraph (1).

(3) **OBTAINING FUTURE DATA.**—NOAA shall, to the extent feasible, obtain commercial weather data from private sector providers.

(4) **AUTHORIZATION OF APPROPRIATIONS.**—There are authorized to be appropriated out of funds made available for procurement, acquisition, and construction at NESDIS, \$9,000,000 for carrying out this subsection.

**SEC. 11. ENVIRONMENTAL INFORMATION SERVICES WORKING GROUP.**

(a) **ESTABLISHMENT.**—The NOAA Science Advisory Board shall continue to maintain a standing working group named the Environmental Information Services Working Group (in this section referred to as the “Working Group”) to—

(1) provide advice for prioritizing weather research initiatives at NOAA to produce real improvement in weather forecasting;

(2) provide advice on existing or emerging technologies or techniques that can be found in private industry or the research community that could be incorporated into forecasting at NWS to improve forecasting skill;

(3) identify opportunities to improve communications between weather forecasters, Federal, State, local, and tribal emergency management personnel, and the public; and to improve communications and partnerships among NOAA and the private and academic sectors; and

(4) address such other matters as the Science Advisory Board requests of the Working Group.

(b) COMPOSITION.—

(1) IN GENERAL.—The Working Group shall be composed of leading experts and innovators from all relevant fields of science and engineering including atmospheric chemistry, atmospheric physics, meteorology, hydrology, social science, risk communications, electrical engineering, and computer sciences. In carrying out this section, the Working Group may organize into subpanels.

(2) NUMBER.—The Working Group shall be composed of no fewer than 15 members. Nominees for the Working Group may be forwarded by the Working Group for approval by the Science Advisory Board. Members of the Working Group may choose a chair (or co-chairs) from among their number with approval by the Science Advisory Board.

(c) ANNUAL REPORT.—The Working Group shall transmit annually to the Science Advisory Board for submission to the Under Secretary a report on progress made by NOAA in adopting the Working Group's recommendations. The Science Advisory Board shall transmit this report to the Under Secretary. Within 30 days of receipt of such report, the Under Secretary shall transmit it to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

**SEC. 12. INTERAGENCY WEATHER RESEARCH AND INNOVATION COORDINATION.**

(a) ESTABLISHMENT.—The Director of the Office of Science and Technology Policy shall establish an Inter-agency Committee for Advancing Weather Services to improve coordination of relevant weather research and forecast innovation activities across the Federal Government. The Interagency Committee shall—

(1) include participation by the National Aeronautics and Space Administration, the Federal Aviation Administration, NOAA and its constituent elements, the National Science Foundation, and such other agencies involved in weather forecasting research as the President determines are appropriate;

(2) identify and prioritize top forecast needs and coordinate those needs against budget requests and program initiatives across participating offices and agencies; and

(3) share information regarding operational needs and forecasting improvements across relevant agencies.

(b) CO-CHAIR.—The Federal Coordinator for Meteorology shall serve as a co-chair of this panel.

(c) FURTHER COORDINATION.—The Director shall take such other steps as are necessary to coordinate the activities of the Federal Government with those of the American weather industry, State governments, emergency managers, and academic researchers.

**SEC. 13. OAR AND NWS EXCHANGE PROGRAM.**

(a) IN GENERAL.—The Assistant Administrator for OAR and the Assistant Administrator for NWS may establish a program to detail OAR personnel to the NWS and NWS personnel to OAR.

(b) GOAL.—The goal of this program is to enhance forecasting innovation through regular, direct interaction between OAR's world-class scientists and NWS's operational staff.

(c) ELEMENTS.—The program shall allow up to 10 OAR staff and NWS staff to spend up to 1 year on detail. Candidates shall be jointly selected by the Assistant Administrator for OAR and the Assistant Administrator for NWS.

(d) REPORT.—The Under Secretary shall report annually to the Committee on Science, Space, and Technology of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate on participation in such program and shall highlight any innovations that come from this interaction.

**SEC. 14. VISITING FELLOWS AT NWS.**

(a) IN GENERAL.—The Assistant Administrator for NWS may establish a program to host postdoctoral fellows and academic researchers at any of the National Centers for Environmental Prediction.

(b) **GOAL.**—This program shall be designed to provide direct interaction between forecasters and talented academic and private sector researchers in an effort to bring innovation to forecasting tools and techniques available to the NWS.

(c) **SELECTION AND APPOINTMENT.**—Such fellows shall be competitively selected and appointed for a term not to exceed 1 year.

**SEC. 15. NOAA WEATHER RADIO ALL HAZARDS “MARK TRAIL” AWARD PROGRAM.**

(a) **PROGRAM.**—The Assistant Administrator for NWS is authorized to establish the NOAA Weather Radio All Hazards “Mark Trail” Award Program. This award program shall provide annual awards to honor individuals or organizations that use or provide NOAA Weather Radio All Hazards receivers or transmitters to save lives and protect property. Individuals or organizations that utilize other early warning tools or applications also qualify for this award.

(b) **GOAL.**—This award program draws attention to the life-saving work of the NOAA Weather Radio All Hazards program, as well as emerging tools and applications, that provide real-time warning to individuals and communities of severe weather or other hazardous conditions.

(c) **PROGRAM ELEMENTS.**—

(1) **NOMINATIONS.**—Nominations for this award shall be made annually by the Weather Field Offices to the Assistant Administrator for NWS. Broadcast meteorologists, weather radio manufacturers and weather warning tool and application developers, emergency managers and public safety officials may nominate individuals and/or organizations to their local Weather Field Offices, but the final list of award nominees must come from the Weather Field Offices.

(2) **SELECTION OF AWARDEES.**—Annually, the Assistant Administrator for NWS shall choose winners of this award whose timely actions, based on NOAA weather radio all hazards receivers or transmitters or other early warning tools and applications, saved lives and/or property or demonstrated public service in support of weather or all hazard warnings.

(3) **AWARD CEREMONY.**—The Assistant Administrator for NWS shall establish a means of making these awards to provide maximum public awareness of the important Weather Radio All Hazards program, and such other warning tools and applications as are represented in the awards.

**SEC. 16. DEFINITIONS.**

In this Act:

(1) **AOA.**—The term “AOA” means an Analysis of Alternatives.

(2) **NESDIS.**—The term “NESDIS” means the National Environmental Satellite, Data, and Information Service.

(3) **NOAA.**—The term “NOAA” means the National Oceanic and Atmospheric Administration.

(4) **NWS.**—The term “NWS” means the National Weather Service.

(5) **OAR.**—The term “OAR” means the Office of Oceanic and Atmospheric Research.

(6) **OSE.**—The term “OSE” means an Observing System Experiment.

(7) **OSSE.**—The term “OSSE” means an Observing System Simulation Experiment.

(8) **UNDER SECRETARY.**—The term “Under Secretary” means the Under Secretary of Commerce for Oceans and Atmosphere.

**SEC. 17. AUTHORIZATION OF APPROPRIATIONS.**

(a) **FISCAL YEAR 2015.**—There are authorized to be appropriated for fiscal year 2015—

(1) \$90,800,000 to OAR to carry out this Act, of which—

(A) \$70,000,000 is authorized for weather laboratories and cooperative institutes; and

(B) \$20,800,000 is authorized for weather and air chemistry research programs; and

(2) out of funds made available for research and development at NOAA, an additional amount of \$16,000,000 for OAR to carry out the joint technology transfer initiative described in section 3(b)(4).

(b) **FISCAL YEARS 2016 AND 2017.**—For each of fiscal years 2016 and 2017, there are authorized to be appropriated to OAR—

(1) \$100,000,000 to carry out this Act, of which—

(A) \$80,000,000 is authorized for weather laboratories and cooperative institutes; and

(B) \$20,000,000 is authorized for weather and air chemistry research programs; and

(2) an additional amount of \$20,000,000 for the joint technology transfer initiative described in section 3(b)(4).

(c) LIMITATION.—No additional funds are authorized to carry out this Act, and the amendments made by this Act.

## COMMITTEE STATEMENT AND VIEWS

### PURPOSE AND SUMMARY

The purpose of H.R. 2413 is to improve the National Oceanic and Atmospheric Administration's weather research through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events, and to expand commercial opportunities for the provision of weather data.

### BACKGROUND AND NEED FOR LEGISLATION

Weather impacts American lives, and extreme weather poses significant risks to important parts of the U.S. economy. NOAA has traced a rise in weather disasters costing the economy up to \$1 billion in damage per weather event, and a recent analysis found that substantial parts of the economy are sensitive to weather variability, representing more than three percent of Gross Domestic Product and nearly \$500 billion a year.<sup>1</sup>

Recent severe weather events in the United States have underscored the need for timely, accurate, and reliable weather forecasts. Within NOAA, the National Weather Service (NWS), the Office of Oceanic and Atmospheric Research (OAR), and the National Environmental Satellite, Data, and Information Service (NESDIS) play important roles in developing and deploying U.S. weather forecasting capabilities.<sup>2</sup> NOAA is joined in this effort by an ever-evolving private sector weather enterprise. The National Academy of Sciences emphasized the importance of this partnership, noting that “[p]rivate sector and other organizations provide sensor data, weather forecasts, and end-user services to a broad set of customers.”<sup>3</sup>

Rapid technological advances in computing and other areas such as remote sensing and advanced radar hold great promise to improve severe weather prediction, but have yet to be fully exploited. This promise was detailed in NOAA's most recent *20 Year Research Vision*, which asserted that emphasis on weather research and technological development will result in significant benefits to public safety:

Severe storm and event warnings will save more lives and property. The enhanced information delivery systems of the future will be well coordinated and able to quickly disseminate severe storm and event warnings. The warnings themselves will see dramatic improvements. For example, tornado warning lead times will be on the order of one hour, rather than minutes. Technology like phased array radar, significant improvements in our under-

<sup>1</sup> <http://journals.ametsoc.org/doi/pdf/10.1175/2011BAMS2928.1>

<sup>2</sup> For more information on these responsibilities, see: “To Observe and Protect: How NOAA Procures Data for Weather Forecasting,” March 28, 2012, <http://science.house.gov/hearing/subcommittee-energy-and-environment-hearing-how-noaa-procures-data-weather-forecasting>.

<sup>3</sup> <http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Weather-Services-Report-Brief.pdf>.



standing of meso-scale weather processes, and the development of models that embody this understanding will enable this accomplishment. Improvements in storm surge forecasting and increased tsunami monitoring/warning capacity will also greatly minimize loss of life and property damage from these hazards.<sup>4</sup>

Citing ongoing concerns about potential data gaps for NOAA's polar-orbiting and geostationary satellite programs, the Government Accountability Office added NOAA's satellite programs to its High Risk List in 2013. This potential gap in weather satellite coverage and management problems with NOAA's satellites have been the subject of several Science, Space, and Technology Committee hearings over many years. The GAO emphasized the potential effects of a gap:

According to program officials from the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), a satellite data gap would result in less accurate and timely weather forecasts and warnings of extreme events—such as hurricanes, storm surges and floods. Such degradation in forecasts and warnings would place lives, property, and our nation's critical infrastructures in danger. Given the criticality of satellite data to weather forecasts, the likelihood of significant gaps, and the potential impact of such gaps on the health and safety of the U.S. population and economy, we concluded that the potential gap in weather satellite data is a high-risk area and added it to the High Risk List in 2013.<sup>5</sup>

In addition, independent reviews of NOAA's weather research portfolio have also recommended a stronger emphasis on moving research-to-operations within NOAA's weather portfolio. In 2010, the National Academy of Public Administration stated that OAR “provides particularly important institutional glue to support innovation across NOAA.”<sup>6</sup> In April 2013, NOAA's Science Advisory Board stated that “unless . . . science is transitioned into operations . . . NOAA will fail in its mission. NOAA must make certain that the intended end use of the scientific information is understood from the start by its researchers working on scientific questions and, ensure that internal as well as external end-user needs are incorporated explicitly into the problem formulation.”<sup>7</sup>

#### LEGISLATIVE HISTORY

On March 25, 2015, the Committee on Science, Space, and Technology passed H.R. 1561, the Weather Research and Forecasting Innovation Act of 2015 by voice vote. H.R. 1561 is substantially similar to last year's H.R. 2413, the Weather Forecasting Improvement Act of 2014, which passed the U.S. House of Representatives on April 1, 2014 by voice vote.

<sup>4</sup>[http://nrc.noaa.gov/sites/nrc/Documents/Reduced%20file%20size\\_20%20yr%20Research%20Vision.pdf](http://nrc.noaa.gov/sites/nrc/Documents/Reduced%20file%20size_20%20yr%20Research%20Vision.pdf).

<sup>5</sup><http://www.gao.gov/assets/670/668415.pdf>.

<sup>6</sup>[http://www.napawash.org/wp-content/uploads/2010/09/NAPA-Final-Report\\_NOAA-Climate-Service-Study\\_September-20101.pdf](http://www.napawash.org/wp-content/uploads/2010/09/NAPA-Final-Report_NOAA-Climate-Service-Study_September-20101.pdf).

<sup>7</sup><http://www.sab.noaa.gov/Reports/2013/SAB%20R&D%20Portfolio%20Review%20Report%20to%20NOAA%20FINAL.pdf>.

Informing this legislation, the Environment Subcommittee held a hearing on May 23, 2013 entitled “Restoring U.S. Leadership in Weather Forecasting.” The purpose of the hearing was to examine ways to improve NOAA weather forecasting, and to receive testimony on draft legislation to prioritize weather-related research. The Committee received testimony from: Mr. Barry Myers, Chief Executive Officer of AccuWeather, Inc. and Mr. Jon Kirchner, President of GeoOptics, Inc. Witnesses discussed the current weather forecasting systems in the U.S. and highlighted opportunities to improve weather forecasting through new technologies.

The Environment Subcommittee also held a hearing on June 26, 2013 entitled “Restoring U.S. Leadership in Weather Forecasting Part 2,” with the purpose of continuing the discussion of improving NOAA’s weather forecasting. The Subcommittee received testimony from: The Honorable Kathryn Sullivan, Acting Administrator at the National Oceanic and Atmospheric Administration; Dr. Kelvin Droegemeier, Vice President for Research, Regents’ Professor for Meteorology, Weathernews Chair Emeritus, University of Oklahoma; Dr. William Gail, Chief Technology Officer, Global Weather Corporation, President-Elect, American Meteorological Society; and Dr. Shuyi Chen, Professor, Meteorology and Physical Oceanography, Rosentiel School of Marine and Atmospheric Sciences, University of Miami.

#### COMMITTEE VIEWS

H.R. 1561, the Weather Research and Forecasting Innovation Act of 2015, aims to enhance NOAA’s protection of lives and property through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events.

The bill codifies ongoing research and development activities and builds upon funds provided by Congress following Superstorm Sandy. The core principle that informs this bill is a firm commitment to restore America’s leadership in numerical weather prediction, forecasting and, risk communication. As Dr. Tom Bogdan, President of the University Corporation for Atmospheric Research, wrote to the Committee when passing this bill in 2013: “By key measures, U.S. weather forecasting capabilities have slipped behind those of a number of international competitors, including the European Union, United Kingdom, and Japan.”

Through prioritization and greater collaboration with the American weather industry and academic partners, H.R. 1561 will result in better prediction of high impact weather events. The Committee is aware of a long series of reports, including from the National Research Council, the National Academy of Public Administration, and the NOAA Science Advisory Board which demonstrate that the Federal weather effort at NOAA has ample room for improvement. A recurring theme of these reports is that efforts to integrate research into the operational needs of the weather service could be much stronger, and that the overall effort at NOAA to consider new ideas and techniques from outside the agency needs to be more vigorous.

Throughout H.R. 1561, the Committee gives responsibility to different line offices within NOAA, but requires coordination between

these offices. The Committee fully expects that the coordination will be real and meaningful, with the goal of improving research-to-operations in a way that improves public safety and efficiency in government. The bill directs the Under Secretary of NOAA to prioritize weather-related activities across all weather programs, especially those that protect American lives and property and enhance our national economy, in all relevant line offices, including NWS, OAR, and NESDIS. This provision highlights that improved forecasting is of central importance to NOAA's public safety mission.

Section 3 codifies and clarifies a NOAA program, led by the Assistant Administrator for OAR, for weather research and forecasting innovation. This program includes a number of elements, including accelerated research, development, and deployment of critical technologies like next-generation radar and aerial observation systems, new global and national models, advanced high performance computing using graphic processing information technology networks, and quantitative assessment tools for measuring the value of data and specific observing systems, as well as a technology transfer initiative between relevant NOAA line offices and in collaboration with external partners. In enumerating the elements of the program in subsection (b), the Committee relied upon the expert advice of the weather enterprise—particularly suggestions from university and not-for-profit research center scientists—to try to capture specific research issues. However, it is not our intent to exclude from consideration other areas of research and development. The Committee's expectation is that the Assistant Administrator for OAR will develop a program that reflects the full range of pertinent research challenges.

The technology transfer initiative prescribed in subsection (b) should be consistent with NOAA's Weather Ready Nation program, build upon the successes of NOAA's weather-related test beds, include the necessary advanced research data handling and processing, and help to ensure that dedicated resources to support research-to-operations are not diverted. In subsection (3)(b)(4), the Committee directs that the Assistant Administrator for Oceanic and Atmospheric Research establish a technology transfer program designed to move the innovations of OAR into the operational work of NWS. In carrying out this subsection, the Assistant Administrator should consult closely with the Assistant Administrator for Weather Services regarding the value of the science and technology to be transitioned, integrated, and implemented into an operational environment. Section 3 further encourages extramural research collaboration and establishes the sense of Congress that NOAA should provide competitive grants, contracts, and cooperative agreements consistent with historic levels. Subsection (c) directs the Assistant Administrator of OAR to collaborate with and support the non-Federal weather research community. The bill requires the Under Secretary to transmit, as part of the budget process, a report that identifies the activities carried out under this section.

Building upon the successes of NOAA's Hurricane Forecast Improvement Program, H.R. 1561 directs the creation of a tornado warning improvement program. Following several deadly tornado outbreaks in 2013, including in Moore, Oklahoma, the tornado program will focus on extending accurate forecasts and warnings to

beyond one hour. The bill also adds language to maintain the Hurricane Forecast Improvement Program. Previous language in the bill regarding the hurricane program indicated it would be substantially similar to the ongoing Hurricane Forecast Improvement Program. The Committee has addressed this issue by editing language to insist that the original HFIP program will be maintained without duplication by other program efforts.

The bill encourages NOAA to address the loss of U.S. competitiveness in weather forecasting by requiring the annual development of a plan to restore and maintain leadership in numerical weather prediction and forecasting. Section 6 goes on to specify that one of the elements of the plan will be that it “identifies and prioritizes specific research and development activities, and performance metrics, weighted to meet the operational weather mission of NWS.” This ensures that the Assistant Administrator for Weather Services will have meaningful input into R&D planning because the plan must reflect, to some degree, initiatives that are tied directly to operational needs. This section also includes a requirement that the agency pay special attention to the social science knowledge necessary to turn improved weather forecasting skills into communications that will help the public take effective steps to be safe.

In order to address observing system needs and potential data gaps, H.R. 1561 also requires NOAA to conduct comprehensive observing system planning. In support of this planning, the Assistant Administrator for OAR shall conduct OSSEs prior to major observing system acquisitions or commercial data purchases. The bill codifies NOAA’s commitment to complete OSSEs on GNSS Radio Occultation and a geostationary hyperspectral sounder global constellation using funds made available in the Superstorm Sandy Supplemental. NOAA has informed the Committee that these OSSE studies are underway and directs the reports be shared with the Committee. The bill directs NOAA to complete the GNSS Radio Occultation OSSE by December 31, 2015, and the geostationary hyperspectral sounder OSSE by December 31, 2016. The bill provides flexibilities within NOAA’s assessment of observing systems, and the OSSE provisions are consistent with NOAA Administrators’ characterization of these experiments as a “powerful tool” to “inform our strategies for investing in observation networks” and “to help determine what new data or technologies will yield the best improvement in forecast accuracy.” These activities should be carried out collaboratively with the Joint Center for Satellite Data Assimilation and other relevant bodies.

Section 10 makes clear that NOAA is not prohibited from purchasing weather data through contracts with commercial providers or the placement of weather satellite instruments on government or private payloads. The Committee views NOAA’s unwillingness to seriously consider all sources of cost-effective, critical weather data, including from commercial providers, as short-sighted and with the potential to compound future data gaps. To help rectify this resistance to non-NOAA sources of observing data, H.R. 1561 directs the Secretary of Commerce to develop and transmit a strategy to enable the procurement of quality commercial weather data, including commercial opportunities for surface-, aviation-, and space-based observations. The purchase of data from commercial satellite

vendors could lead to the best pricing for quality weather data. In assessing the range of commercial opportunities and developing the strategy of quality commercial weather data, the full range of commercial options must be considered, including FAR and non-FAR opportunities, public-private partnerships, commercial service agreements, anchor tenancy agreements, and pay on delivery contracts. NASA has provided a model for many of these options, including data purchases and NASA's Commercial Orbital Transportation Services for working with commercial companies cost-effectively to build confidence in commercial capabilities. If the Department of Commerce requires revised authority in order to implement one or more of these options, the strategy should clearly note this but it should not be a primary criterion in negatively assessing an option.

Section 10 also establishes a pilot program to enable NOAA to purchase and test space-based data from private sector companies. The program first directs NOAA to publish data standards and specifications for commercial weather data. It also directs NOAA to enter into at least one contract with a private sector entity capable of providing data that meets the standards and specifications outlined by NOAA. The Committee is aware of various space-based weather technologies that can augment and improve NOAA's existing observing systems. Namely, GNSS Radio Occultation and geostationary hyperspectral sounders are key technologies that could provide substantial upgrades to our forecasting capabilities. The Committee has been informed by numerous sources on the advancements of these technologies and understands that GNSS Radio Occultation is the most mature at this time. The bill provides \$9 million to carry out the contract(s). This money is authorized out of funds made available from the procurement, acquisition, and construction account at NESDIS.

H.R. 1561 authorizes funding to allow NOAA to carry out a balanced portfolio of research and development related to weather forecasting and other areas. Authorization of funds for the joint technology transfer initiative enabled by OAR's Global Systems Division advanced data facility indicates the Committee's desire to ensure that dedicated research-to-operations be preserved in order to promote active partnerships between NOAA line offices. The FY 2013 Disaster Relief Appropriations Act "kick-started" important weather forecasting improvement initiatives by providing initial program funding and making possible the procurement of critical enabling hardware such as a Global Hawk for the OAR unmanned aircraft system research and development program and graphic processing unit supercomputing infrastructure for revolutionary new model development. The funding authorized by this bill will follow through on these initiatives by making possible robust operational base technology development programs for new aerial weather observing systems to provide better meteorological data, higher performance research computing, accelerated development of next generation global and national/regional weather models, and an institutionalized OSSE process capability. Dedicated OAR funding for the direct transfer of new knowledge, technologies, and applications to the NWS and other agencies and entities under a "real-time research" approach completes this vision. The bill au-

thorizes appropriations to be made out of the overall funding for operations, research, and facilities at OAR.

#### SECTION-BY-SECTION

##### *Section 1. Short title*

This section established the short title as the “Weather Research and Forecasting Innovation Act of 2015”.

##### *Section 2. Public safety priority*

This section directs the Under Secretary of the National Oceanic and Atmospheric Administration (NOAA Administrator) to prioritize weather research across all weather programs, including weather data, forecasts, and warnings for the protection of lives and property.

##### *Section 3. Weather research and forecasting innovation*

Section 3 directs the Assistant Administrator of the Office of Oceanic and Atmospheric Research (OAR), in consultation with the Assistant Administrator of the Weather Service, to undertake a weather research program and directs the Assistant Administrator to place priority on developing more accurate, timely, and effective warnings and forecasts of high impact weather events that endanger life and property. Section 3 further defines the specific program elements to include advanced radar, aerial systems, computing/modeling, and Observing System Stimulation Experiments (OSSE) and codifies a longstanding joint OAR-National Weather Service (NWS) tech transfer program, moving its funding from NWS. Finally, this section also directs NOAA to support weather research through competitive grants, contracts, and cooperative agreements.

##### *Section 4. Tornado Warning Improvement and Extension Program*

This section establishes a Tornado Warning Improvement and Extension Program focused on developing and extending accurate tornado forecasts and warnings beyond one hour in order to reduce loss of life, injury, and damage to the economy.

##### *Section 5. Hurricane Forecast Improvement Program*

Section 5 maintains the Hurricane Forecast Improvement Program focused on extending accurate hurricane forecasts and warnings in order to reduce loss of life, injury, and damage to the economy.

##### *Section 6. Weather research and development planning*

Section 6 requires NOAA to develop a prioritized weather research plan to guide activities authorized under the Act and restore U.S. leadership in weather modeling, prediction, and forecasting. The section requires the plan to also identify, through consultation with the National Science Foundation, the research necessary to integrate social science knowledge into weather forecast and warning processes.

##### *Section 7. Observing system planning*

Section 7 directs NOAA to maintain a list of observation data requirements and systematically evaluate the combination of systems

necessary to meet such requirements. This section further directs NOAA to identify current and potential future data gaps in observing capabilities and develop a range of options to address any identified gaps.

*Section 8. Observing system simulation experiments*

This section directs NOAA to undertake Observing System Simulation Experiments (OSSEs) to quantitatively assess the relative value and benefits of observing capabilities and systems. This section identifies specific instances when an OSSE must be performed. Section 8 specifies that OSSEs shall be conducted prior to acquisition of government owned or leased operational observing systems.

*Section 9. Computing resources prioritization report*

Section 9 directs NOAA to issue a plan that explains how it intends to: (1) aggressively pursue the fastest, most powerful, and cost effective high performance computing technologies in support of its weather prediction mission; (2) ensure a balance between the research to operations requirements; (3) take advantage of advanced development concepts; and (4) use existing computing resources to improve advanced research and operational weather prediction.

*Section 10. Commercial weather data*

This section clarifies restrictions in existing law prohibiting the sale of weather satellite systems to the private sector do not extend to the purchase of weather data through contracts with commercial providers or the placement of instruments on private payloads. This section requires the Secretary of Commerce to transmit a strategy that assesses the range of commercial opportunities for obtaining both surface-based and space-based weather observations. The strategy shall include an analysis of financial or other benefits, methods to address planning and budgeting, and identification of the changes needed to facilitate effective implementation of such strategy. This section also establishes a pilot program for providing commercial weather data. The program directs NOAA to enter into a contract or contracts with private sector entities to provide data under criteria determined by NOAA. The Pilot Project authorizes, out of funds made available to NOAA's Satellite Office, \$9,000,000 to carry out the contract or contracts entered into for providing commercial weather data.

*Section 11. The Environmental Information Services Working Group*

Section 11 tasks NOAA's already-established Environmental Information Services Working Group to provide advice for prioritizing weather research initiatives at NOAA and identify emerging technologies. The Working Group shall be composed of leading experts and innovators from all relevant fields of science and engineering. The Working Group will transmit an annual report to the Undersecretary. The Undersecretary will relay such reports to the Committee.

*Section 12. Interagency weather research and innovation coordination*

This section requires the Director of the Office of Science and Technology Policy to establish an Interagency Committee for Advancing Weather Services. The Committee will improve coordination of relevant weather research and forecast innovation activities across the federal government.

*Section 13. Visiting OAR Researchers Program*

Section 13 grants the Assistant Administrator for OAR the authority to establish a program to detail OAR researchers to NWS. If OAR establishes the program, it allows between five and fifteen OAR staff to spend up to one year on detail to the NWS to allow for productive interaction to improve forecasting capabilities. The Undersecretary shall submit an annual report to the Science Committee detailing the program participation and highlighting any innovations that come from this interaction.

*Section 14. Visiting fellows at NWS*

This section allows the Assistant Administrator for NWS to establish a program to host post-doctoral fellows and academic researchers at any of the National Centers for Environmental Prediction.

*Section 15. NOAA Weather Radio All Hazards “Mark Trail” Award Program*

Section 15 reinstates a previously established program that honors individuals or organizations that use or provide NOAA Weather Radio All Hazards receivers or transmitters. The nominations for this honor shall be made by the Weather Services’ field offices. The Assistant Administrator for the Weather Service shall choose the winners, and make the public aware of the honors. This program costs no money to carry out.

*Section 16. Definitions*

This section provides definitions for terms in the bill.

*Section 17. Authorization of appropriations*

Section 17 authorizes \$90.8 million for Fiscal Year 2015 to carry out the weather research program established under section 3. It further specifies that out of the \$90.8 million provided in this section, \$70.0 million is authorized for weather laboratories and cooperative institutes and \$20.8 million is authorized for weather and air chemistry research programs. It also authorizes for FY 2015, \$16 million to carry out the joint technology transfer initiative described in section 3.

For FY2016 and FY2017, the section authorizes \$100 million to carry out the weather research program established under section 3. It further specifies that out of the \$100 million provided in this section, \$80 million is authorized for weather laboratories and cooperative institutes and \$20 million is authorized for weather and air chemistry research programs. Finally, this section also authorizes \$20 million annually to carry out the joint technology transfer initiative described in section 3. No additional funds are authorized to carry out this Act, and the amendments made by this Act.



## EXPLANATION OF AMENDMENTS

An amendment offered by Mr. Beyer to add “Federal, State, local, and tribal” to the emergency management personnel that the Environmental Information Services Working Group seeks to have better communication with, in addition to weather forecasters and the public was adopted.

An amendment offered by Mr. Grayson: to strike “Warning” and insert “Forecast” into the section 5 title was adopted. This language helps clarify that the program does not duplicate current hurricane research efforts at NOAA.

## COMMITTEE CONSIDERATION

On March 25, 2015, the Committee met in open session and ordered reported favorably the bill, H.R. 1561, as amended, by voice vote, a quorum being present.

## APPLICATION OF LAW TO THE LEGISLATIVE BRANCH

Section 102(b)(3) of Public Law 104–1 requires a description of the application of this bill to the legislative branch where the bill relates to the terms and conditions of employment or access to public services and accommodations. This bill improves the National Oceanic and Atmospheric Administration’s weather research through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events, and to expand commercial opportunities for the provision of weather data. As such this bill does not relate to employment or access to public services and accommodations.

## STATEMENT OF OVERSIGHT FINDINGS AND RECOMMENDATIONS OF THE COMMITTEE

In compliance with clause 3(c)(1) of rule XIII and clause (2)(b)(1) of rule X of the Rules of the House of Representatives, the Committee’s oversight findings and recommendations are reflected in the descriptive portions of this report.

## STATEMENT OF GENERAL PERFORMANCE GOALS AND OBJECTIVES

H.R. 1561 would direct the Under Secretary of the National Oceanic and Atmospheric Administration (NOAA Administrator) to prioritize weather research across all weather programs, including weather data, forecasts, and warnings for the protection of lives and property.

## DUPLICATION OF FEDERAL PROGRAMS

No provision of H.R. 1561 establishes or reauthorizes a program of the Federal Government known to be duplicative of another Federal program, a program that was included in any report from the Government Accountability Office to Congress pursuant to section 21 of Public Law 111–139, or a program related to a program identified in the most recent Catalog of Federal Domestic Assistance.

## DISCLOSURE OF DIRECTED RULE MAKINGS

The Committee estimates that enacting H.R. 1561 does not direct the completion of any specific rule makings within the meaning of 5 U.S.C. 551.

## FEDERAL ADVISORY COMMITTEE ACT

The Committee finds that the legislation does not establish or authorize the establishment of an advisory committee within the definition of 5 U.S.C. App., Section 5(b).

## UNFUNDED MANDATE STATEMENT

Section 423 of the Congressional Budget and Impoundment Control Act (as amended by Section 101(a)(2) of the Unfunded Mandate Reform Act, P.L. 104-4) requires a statement as to whether the provisions of the reported include unfunded mandates. In compliance with this requirement the Committee has received a letter from the Congressional Budget Office included herein.

## EARMARK IDENTIFICATION

H.R. 1561 does not include any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9 of rule XXI.

## COMMITTEE ESTIMATE

Clause 3(d)(2) of rule XIII of the Rules of the House of Representatives requires an estimate and a comparison by the Committee of the costs that would be incurred in carrying out H.R. 1561. However, clause 3(d)(3)(B) of that rule provides that this requirement does not apply when the Committee has included in its report a timely submitted cost estimate of the bill prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act.

BUDGET AUTHORITY AND CONGRESSIONAL BUDGET OFFICE COST  
ESTIMATE

With respect to the requirements of clause 3(c)(2) of rule XIII of the Rules of the House of Representatives and section 308(a) of the Congressional Budget Act of 1974 and with respect to requirements of clause (3)(c)(3) of rule XIII of the Rules of the House of Representatives and section 402 of the Congressional Budget Act of 1974, the Committee has received the following cost estimate for H.R. 1561 from the Director of Congressional Budget Office:

MAY 12, 2015.

Hon. LAMAR SMITH,  
*Chairman, Committee on Science, Space, and Technology,*  
*House of Representatives, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 1561, the Weather Research and Forecasting Innovation Act of 2015.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Jeff LaFave.

Sincerely,

KEITH HALL.

Enclosure.

*H.R. 1561—Weather Research and Forecasting Innovation Act of 2015*

Summary: H.R. 1561 would authorize the appropriation of \$120 million for each of fiscal years 2016 and 2017 for the National Oceanic and Atmospheric Administration (NOAA) to improve forecasting of severe weather events. The bill also would authorize NOAA to carry out various other activities related to weather forecasting and research.

Assuming appropriation of the authorized amounts, CBO estimates that implementing the legislation would cost \$240 million over the 2016–2020 period. Enacting H.R. 1561 would not affect direct spending or revenues, therefore, pay-as-you-go procedures do not apply.

H.R. 1561 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments. Public entities, such as weather and emergency response agencies and public universities, would benefit from cooperative arrangements and federal grants authorized in the bill for research and weather-related activities.

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 1561 is shown in the following table. The costs of this legislation fall within budget function 300 (natural resources and environment).

	By fiscal year, in millions of dollars—					
	2016	2017	2018	2019	2020	2016–2020
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Authorization Level .....	120	120	0	0	0	240
Estimated Outlays .....	78	102	38	18	4	240

Basis of estimate: For this estimate, CBO assumes that the legislation will be enacted near the end of 2015 and that the authorized amounts will be appropriated for each fiscal year. Estimated outlays are based on historical spending patterns for NOAA programs. Although funds have probably been appropriated in fiscal year 2015 to conduct certain activities authorized under the bill, CBO cannot identify those amounts because NOAA has not provided information regarding the amounts of appropriated funds allocated to those activities.

H.R. 1561 would authorize the appropriation of \$120 million a year over the 2016–2017 period for NOAA to develop a program to improve forecasting of severe weather events. Under the bill, NOAA would use those funds to purchase equipment and conduct research to improve the agency's forecasting capabilities and warning systems and enter into a contract with at least one private-sector entity to provide commercial weather data. Assuming appropriation of the authorized amounts, CBO estimates that imple-

menting the program would cost \$240 million over the 2016–2020 period.

Pay-As-You-Go considerations: None.

Intergovernmental and private-sector impact: H.R. 1561 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments. Public entities, such as weather and emergency response agencies and public universities, would benefit from cooperative arrangements and federal grants authorized in the bill for research and weather-related activities.

Estimate prepared by: Federal costs: Jeff LaFave; Impact on state, local, and tribal governments: Jon Sperl; Impact on the private sector: Amy Petz.

Estimate approved by: Theresa Gullo, Assistant Director for Budget Analysis.

#### CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (new matter is printed in italic and existing law in which no change is proposed is shown in roman):

### TITLE 51, UNITED STATES CODE

\* \* \* \* \*

## Subtitle VI—Earth Observations

\* \* \* \* \*

### CHAPTER 601—LAND REMOTE SENSING POLICY

\* \* \* \* \*

## Subchapter VI—Prohibition of Commercialization of Weather Satellites

\* \* \* \* \*

### § 60161. Prohibition

Neither the President nor any other official of the Government shall make any effort to lease, sell, or transfer to the private sector, or commercialize, any portion of the weather satellite systems operated by the Department of Commerce or any successor agency. *This prohibition shall not extend to—*

- (1) *the purchase of weather data through contracts with commercial providers; or*
- (2) *the placement of weather satellite instruments on cohosted government or private payloads.*

\* \* \* \* \*