

Calendar No. 455

114TH CONGRESS }
2d Session }

SENATE

{ REPORT
{ 114-248

SEASONAL FORECASTING IMPROVEMENT
ACT

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 1331



MAY 9, 2016.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

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MAY 9, 2016.—Ordered to be printed

Mr. THUNE, from the Committee on Commerce, Science, and
Transportation, submitted the following

R E P O R T

[To accompany S. 1331]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1331) to help enhance commerce through improved seasonal forecasts, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 1331, the Seasonal Forecasting Improvement Act, is to improve seasonal forecasts, speed research to operations, and enhance satellite governance.

BACKGROUND AND NEEDS

Improved weather forecasts not only reduce the loss of life from severe weather conditions, but have broader benefits to the general public. It is estimated the collective benefit of weather forecasting to the American public was \$31.5 billion, compared to the \$5.1 billion spent in 2007 on generating weather forecasts in the United States. Of the money spent yearly on weather forecasting, a little over two-thirds, or \$3.4 billion, was spent by Federal agencies.¹ Reliable observations and continued research will help to further improve forecasts, and these improvements will likely correspond to an even larger benefit for individuals, businesses, and the broader

¹Jeffrey K. Lazo, Rebecca E. Morss, and Julie L. Demuth, “300 Billion Served: Sources, Perceptions, Uses, and Values of Weather Forecasts,” *Bulletin of the American Meteorological Society*, vol. 90, no. 6 (June 2009), pp. 785-798, available at journals.ametsoc.org/doi/pdf/10.1175/2008BAMS2604.1 (accessed November 22, 2013).

economy. Weather forecasts for periods beyond two weeks are currently substantially less reliable, but if they were improved have the potential to have significant economic and social benefit. For example, farmers, ranchers, and water managers all need to make decisions on time scales longer than two weeks, and must currently do so without the benefit of reliable forecasts.²

Federal Weather Services

Several line offices of the National Oceanic and Atmospheric Administration (NOAA) are integral to the Federal weather enterprise. Most obviously, the National Weather Service (NWS) is charged with providing weather, water, and climate data, forecasts, and warnings in order to protect life and property and to enhance the Nation's economy.³ The National Environmental Satellite, Data, and Information Service (NESDIS) is involved in acquiring and managing Federal environmental observing satellites, and it operates the data centers that capture and process the information from these satellites. Several satellite programs support NWS's operational weather forecasting mission. A third line office at NOAA, the Office of Oceanic and Atmospheric Research (OAR), carries out much of the basic research that supports NWS's operational forecasts. For example, OAR participates in and funds cooperative institutes, which foster collaboration between NOAA scientists and academic institutions. OAR also supports several test beds, where NOAA scientists, academics, and forecasters work together to move the state-of-the-art science into operational forecasts (this is part of a process that is sometimes referred to as research-to-operations or R2O). As recognized by a recent NOAA Science Advisory Board report, if the basic science developed at the agency fails to be applied to the operational goals of NOAA, then the agency "will fail in its mission."⁴

The line offices within NOAA work together to collect and transmit weather information, but this intra-agency coordination should be strengthened. The work of the National Ocean Service provides context for weather products, including information about tides, currents, bathymetry, and topography. Furthermore, the Office of Marine and Aviation Operations provides the fleet of ships and aircraft piloted by NOAA Commissioned Officers to take measurements integral to NOAA weather missions.

Other Federal agencies also use NOAA weather products. The Coast Guard uses NOAA satellite data extensively, both for weather data and to plan and execute search and rescue missions. The Federal Aviation Administration partners with the NWS Aviation Weather Center to fund new developments in aviation weather prediction, such as the NextGen weather program to decrease the occurrence of weather-related aviation delays. The Department of Defense operates some of its own weather programs in order to meet its specific needs. In particular, the Air Force has been heavily in-

²National Research Council, Assessment of Intraseasonal to Interannual Climate Prediction and Predictability, 2010, available at <http://www.nap.edu/catalog/12878/assessment-of-intraseasonal-to-interannual-climate-prediction-and-predictability> (accessed May 14, 2015).

³National Weather Service, About NOAA's National Weather Service, available at <http://www.weather.gov/about> (accessed April 10, 2013).

⁴The R&D Portfolio Review Task Force, In the Nation's Best Interest: Making the Most of NOAA's Science Enterprise, Final Report to the NOAA Science Advisory Board, March 27, 2013, available at http://www.sab.noaa.gov/Meetings/2013/march/PRTF_report_final.pdf (accessed April 10, 2015).

volved in weather prediction and satellite procurement, but in the last few years it has scaled back its efforts. In April 2015, the Air Force announced that it would rely primarily on a United Kingdom weather model, instead of a U.S. weather model. The Air Force is reported to have made this decision without consulting the other armed services or other agencies involved in weather prediction.⁵ The Office of the Federal Coordinator for Meteorology was created by the Department of Commerce in 1964 to coordinate the meteorological activities of Federal departments and agencies,⁶ but as demonstrated by the Air Force's recent decision, there is still often a lack of coordination.

National Weather Service

The NWS aims to: produce and deliver accurate forecasts; reduce, and ultimately eliminate, weather-related fatalities; and improve the economic value of weather, water, and climate information. NWS data and products form a national information database and infrastructure that is used by other government agencies, private sector weather services organizations (e.g., The Weather Channel and Accuweather), and the public. The NWS collects data from a variety of sources, including: Doppler weather radars; satellites operated by NESDIS; data buoys for marine observations; radiosonde carried by weather balloons; surface observing systems; and instruments for monitoring space weather and air quality.

Role of Satellites in Supporting Weather Operations

Satellites make up approximately 40 percent of the NOAA budget; NESDIS was funded at about \$2.2 billion in fiscal year (FY) 2015.⁷ Currently, NESDIS, in collaboration with the National Aeronautics and Space Administration and the Air Force, manages and operates a fleet of over 10 weather and environmental monitoring satellites.⁸ These satellites monitor Earth constantly to provide data on temperature, sea surface height, cloud cover, and other data that inform weather and climate models. Two types of satellites provide most of our weather and climate data: geostationary and polar-orbiting satellites.

The 2 primary and 1 back up Geostationary Operational Environmental Satellites (GOES) orbit 22,300 miles above the Earth's equator and provide coverage of the western hemisphere, taking photographic images every 15 minutes. The GOES satellites are critical for identifying severe weather, snowstorms, tropical storms, and hurricanes. The GOES satellites are also capable of assisting in search and rescue activities by locating emergency beacons that have been activated by individuals in distress.⁹ The next genera-

⁵Jason Samenow, "Air Force's plan to drop U.S. forecast system for U.K. model draws criticism," The Washington Post, April 20, 2015, available at: <http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2015/04/20/air-force-to-cut-ties-with-u-s-weather-forecast-system-in-favor-of-uk-model/> (accessed May 15, 2015).

⁶Office of the Federal Coordinator for Meteorology, Office of the Federal Coordinator for Meteorology, available at <http://www.ofcm.gov/default.htm> (accessed September 4, 2015).

⁷National Oceanic and Atmospheric Association, FY2016 NOAA Budget Summary, 2015, available at http://www.corporateservices.noaa.gov/~nbo/fy16_bluebook/FY2016BudgetSummary-web.pdf (accessed May 14, 2015).

⁸National Oceanic and Atmospheric Association, Satellite and Information Service, 2015, available at http://www.nesdis.noaa.gov/imagery_data.html (accessed October 16, 2015).

⁹National Oceanic and Atmospheric Association, Geostationary Operational Environmental Satellite R-Series, available at <http://www.goes-r.gov/> (accessed May 15, 2015).

tion GOES satellite was originally scheduled to launch in October 2015, but has been twice delayed. A new launch date has not been finalized, but will likely be in the fall 2016.¹⁰

Polar satellites orbit completely around the Earth's poles from about 500 miles above the Earth's surface, and travel 14 full orbits per day. Polar orbiting satellites provide a detailed picture of the entire planet, and primarily assist in medium- to long-range weather forecasts (i.e., 5 to 10 days out). Polar-orbiting satellites provide a broad range of environmental monitoring data, including global sea surface temperature measurements, measurements of temperature and humidity of the atmosphere, information about volcanic eruptions, detection of forest fires, and analyses of global vegetation cover.¹¹ NOAA most recently launched a polar orbiting satellite in 2011, the Suomi National Polar-orbiting Partnership (SNPP). SNPP is the primary operational polar orbiting satellite, though currently there are several legacy polar satellites that can provide back up in the case of a failure of SNPP. The next generation of polar orbiting satellites is the Joint Polar Satellite System (JPSS), which currently includes two satellites, JPSS-1 and JPSS-2. JPSS-1 is scheduled to launch in early 2017. Because the SNPP satellite's mission life only extends through 2016 and its design life only extends through 2018, many are concerned about a data gap before JPSS becomes operational. The JPSS program received approximately \$916 million in appropriations during FY 2015. The budget request for FY 2016 is \$809 million, with an additional \$380 million in funding requested for the development of a follow on to JPSS-2 and to mitigate potential data gaps among SNPP, JPSS-1, and JPSS-2.¹²

The Department of Commerce's Office of Inspector General has identified NOAA's satellite programs as one of the top five management challenges facing the Department in several recent reports.¹³ Both the JPSS and GOES satellite programs face risks of coverage gaps in the future due to cost overruns and schedule delays. While NOAA has made some effort to address these concerns, the rate of increase in satellite spending has continued to exceed the increase in NOAA's topline budget.

Seasonal Forecasts

A scientific challenge for the NWS and other NOAA scientists is to improve subseasonal, seasonal, and interannual predictions, which look at long-term forecasts for future weeks, months, and years. These forecasts are important to public and private decision-

¹⁰ Frank Konkell, "\$11 Billion Next-Gen Weather Satellite Launch Delayed," Nextgov, August 20, 2015, available at <http://www.nextgov.com/emerging-tech/emerging-tech-blog/2015/08/11-billion-next-gen-weather-satellite-launch-delayed/119311/> (accessed September 3, 2015).

¹¹ National Oceanic and Atmospheric Association, Joint Polar Satellite System, available at http://www.jpss.noaa.gov/FactSheets/JPSS_Overview.pdf (accessed May 14, 2015).

¹² National Oceanic and Atmospheric Association, FY2016 NOAA Budget Summary, 2015, available at http://www.corporateservices.noaa.gov/~nbo/fy16_bluebook/FY2016BudgetSummary-web.pdf (accessed May 14, 2015).

¹³ Department of Commerce Office of Inspector General, Top Management Challenges Facing the Department of Commerce, Final Report No. OIG-12-003, 2011, available at <http://www.oig.doc.gov/OIGPublications/TMC-FY12-OIG-12-003.pdf> (accessed December 4, 2013). Department of Commerce Office of Inspector General, Top Management Challenges Facing the Department of Commerce, Final Report No. OIG-13-003, 2012, available at <http://www.oig.doc.gov/OIGPublications/TMC-FY13-OIG-13-003.pdf> (accessed December 4, 2013). Department of Commerce Office of Inspector General, Top Management Challenges Facing the Department of Commerce, Final Report No. OIG-14-002, 2013, available at <http://www.oig.doc.gov/OIGPublications/TMC-FY14-OIG-14-002.pdf> (accessed December 4, 2013).

makers, such as farmers, insurance firms, and water resource managers, but reliable long-term forecasts have proved elusive. For example, seasonal predictions of heavy snowstorms in 2014 could have prevented the exhaustion of national supplies of road salt, which left cities from Kansas to New Jersey scrambling to keep their roads safe.¹⁴ In addition, NOAA's seasonal forecast for the 2013 Atlantic hurricane season overestimated the number of named storms in the early part of the season.¹⁵

Improved predictions on these longer time-scales require accurate observations and dynamic models that represent the oceans and atmosphere.¹⁶ Though there is currently no perfect model, improved forecasts have resulted from efforts that average the results of multiple existing models. This effort requires researchers to coordinate to ensure the output from their various models is compatible.¹⁷ Additionally, an interagency effort, the Earth System Prediction Capability, seeks to coordinate existing forecast efforts on all time-scales, from hourly to multi-year.¹⁸

SUMMARY OF PROVISIONS

S. 1331, the Seasonal Forecasting Improvement Act, as reported, would reauthorize and modify NOAA's Weather Research Program in order to better focus NOAA's research to operations program as well as increase the speed with which NOAA research is operationalized. It also would enhance NOAA's satellite governance and ensure the best value is sought in procuring future satellites. In addition, S. 1331 would improve seasonal-scale forecasts and the communication of these forecasts. It would inform a strategy for NOAA's future weather observations by first establishing a Weather Commission to solicit user input to determine the highest priority products that NOAA produces. The bill would then require a National Academy of Sciences report to examine strategies to procure observations utilizing the findings of the Weather Commission as well as the 2017 study entitled "Earth Science and Applications from Space." NOAA would be required to establish a National Water Center and maintain the Hurricane Forecast Improvement Project. Finally, it also would require the Office of Science and Technology Policy to establish a Federal Coordinator for Meteorology.

LEGISLATIVE HISTORY

On April 11, 2015, the Committee on Commerce, Science, and Transportation of the Senate held a hearing entitled "Weathering

¹⁴ Frank Morris, "Got Road Salt? Cities across the country are running out of it," NPR, February 17, 2015, available at <http://www.npr.org/2014/02/17/275899324/got-road-salt-cities-across-the-country-are-running-out-of-it> (accessed April 15, 2015).

¹⁵ Brian McNoldy, "What happened to hurricane season? And why we should keep forecasting it..." The Washington Post, September 30, 2013, available at: <http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2013/09/30/what-happened-to-hurricane-season-and-why-we-should-keep-forecasting-it/> (accessed December 5, 2013).

¹⁶ National Research Council, Assessment of Intraseasonal to Interannual Climate Prediction and Predictability, 2010, available at <http://www.nap.edu/catalog/12878/assessment-of-intraseasonal-to-interannual-climate-prediction-and-predictability> (accessed May 14, 2015).

¹⁷ National Oceanic and Atmospheric Association, North American Multi-Model Ensemble (NMME), available at http://www.cpc.ncep.noaa.gov/products/NMME/NMME_description.html (accessed May 14, 2015).

¹⁸ National Oceanic and Atmospheric Association, National Earth System Prediction Capability, available at <http://espc.oar.noaa.gov/> (accessed May 14, 2015).

the Storm: How Can We Better Communicate Weather to Enhance Commerce and Safety?”

S. 1331 was introduced by Senator Thune on May 13, 2015. It was cosponsored by Senator Schatz. On May 20, 2015, the Committee met in open Executive Session and, by a voice vote, ordered a substitute version of S. 1331 reported favorably. Amendments were offered by Senators Booker, Cantwell, Markey, Nelson, Rubio, and Udall, all of which were adopted.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

S. 1331—Seasonal Forecasting Improvement Act

Summary: S. 1331 would authorize appropriations totaling \$190 million over the 2016–2020 period for the National Oceanic and Atmospheric Administration (NOAA) to expand and improve its capabilities for seasonal weather forecasting. The bill also would require NOAA to carry out various activities relating to the collection, analysis, and dissemination of forecast data.

Assuming appropriation of the authorized amounts, CBO estimates that implementing the legislation would cost \$172 million over the 2016–2020 period. Because enacting S. 1331 would not affect direct spending or revenues, pay-as-you-go procedures do not apply.

S. 1331 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.

Estimated Cost to the Federal Government: The estimated budgetary impact of S. 1331 is shown in the following table. The costs of this legislation fall within budget function 300 (environment and natural resources).

	By fiscal year, in millions of dollars—					
	2016	2017	2018	2019	2020	2016–2020
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Seasonal Forecasting Improvement:						
Authorization Level	27	27	27	27	27	133
Estimated Outlays	18	23	26	27	27	120
Weather Research Program:						
Authorization Level	10	10	10	10	10	50
Estimated Outlays	6	9	10	10	10	45
Other Activities:						
Authorization Level	1	2	2	2	0	7
Estimated Outlays	1	2	2	2	*	7
Total Changes:						
Authorization Level	38	39	39	39	37	190
Estimated Outlays	25	334	38	39	37	172

Note: Components do not sum to totals because of rounding.
* = Less than \$500,000.

Basis of Estimate: For this estimate, CBO assumes that the legislation will be enacted late in 2015 and that the authorized amounts will be appropriated for each fiscal year. Estimated out-

lays are based on historical spending patterns for NOAA's forecasting and research activities.

S. 1331 would authorize the appropriation of \$26.5 million a year through 2020 for NOAA to develop and disseminate seasonal temperature and precipitation forecasts. Under the bill, NOAA would create an Internet clearinghouse for seasonal forecasts and would build upon existing forecasting programs and partnerships with other institutions and agencies. The bill also would authorize NOAA to award grants to states to receive and distribute forecasts and related information. Assuming appropriation of the authorized amounts, CBO estimates that carrying out those activities would cost \$120 million over the 2016–2020 period.

The bill also would authorize the appropriation of \$10 million a year through 2020 to create a weather research program. The program would track, evaluate, and support ongoing research projects conducted by the Office of Oceanic and Atmospheric Research. Assuming appropriation of the authorized amounts, CBO estimates that implementing this provision would cost \$45 million over the 2016–2020 period.

Finally, S. 1331 would authorize the appropriation of \$1 million a year over the 2017–2019 period for NOAA to enter into an agreement with the National Academy of Sciences (or a similar organization) to conduct a study of the scope and cost-effectiveness of NOAA's satellite systems. The bill also would authorize the appropriation of \$1 million a year through 2019 to establish a weather commission to advise the federal government on weather forecasting. Assuming appropriations of the authorized amounts, CBO estimates that implementing these provisions would cost \$7 million over the 2016–2020 period.

Pay-As-You-Go Considerations: None.

Intergovernmental and Private-Sector impact: S. 1331 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 state and local weather agencies and public universities, would benefit from cooperative arrangements and federal grants authorized in the bill. Any costs incurred by those entities, including matching contributions, would be incurred voluntarily.

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

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

REGULATORY IMPACT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

S. 1331 as reported would not create any new programs or impose any new regulatory requirements, and therefore would not subject any individuals or businesses to new regulations.

ECONOMIC IMPACT

Enactment of this legislation is not expected to have any inflationary or adverse impact on the Nation's economy.

PRIVACY

The bill would not impact the personal privacy of individuals.

PAPERWORK

S. 1331 would require reports from the Federal Government. The Administrator of NOAA would provide to Congress reports on seasonal forecasts, research to operations, urban weather, the findings of the Weather Commission, and the impact of the Air Force's divestiture in the United States Weather Research and Forecasting Model. The Administrator also would be required to provide an annual report on research to operations. It also would require a report from the National Water Center and a report from the National Academy of Sciences.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would designate the short title of the bill as the "Seasonal Forecasting Improvement Act."

Section 2. Improving seasonal forecasts for agriculture and commerce.

This section would direct NOAA to create usable, reliable, and timely seasonal forecasts, and determine the impact of these forecasts on a variety of other weather conditions. In producing these forecasts, NOAA would be required to leverage existing research and resources; it is not the Committee's intention that NOAA establishes new programs in order to fulfill this section. NOAA has adequate established programs, including existing programs at the regional level. Rather, NOAA would focus on providing resources to existing programs, coordinating existing activities, and better communicating research and products. This section would require the forecasts to be distributed to decision-makers at the Federal, regional, State, tribal, and local levels of government; the private sector; and the public. In its communication with the private sector, NOAA would ensure it is reaching the entire weather enterprise, including companies that provide business-to-business weather forecasts and products. This section would provide grants to States for establishing Forecast Communication Coordinators in each State. Many States already have personnel who are effectively serving in this role. It is the Committee's intention that a State could use these funds to better support their existing personnel. In administering the grants, NOAA would not require States to make

a new hire. NOAA also would be required to develop a report on how seasonal forecasts are currently used and goals for the further development of forecasts and other related products. It is the intention of the Committee that NOAA would focus on developing predictions that have the highest likelihood of providing accurate and usable information to the public.

Section 3. United States Weather Research Program.

This section would reauthorize the Weather Research Program. It would require OAR to annually develop a list of its five weather projects closest to operationalization and detail the status of these projects and the plan for operationalization of the projects. NOAA also would be required to create a list of on-going research projects. In creating such a list, NOAA need not detail every component of projects. It is sufficient that NOAA list projects that have a total budget of over \$250,000. This section also would establish teams from OAR and the NWS to oversee the operationalization of such projects. This section would encourage collaboration and coordination among OAR, the rest of NOAA, and relevant user communities. OAR would be required to develop internal mechanisms to ensure projects are progressing and meeting goals. OAR also would be required to develop test beds.

Section 4. National Oceanic and Atmospheric Administration satellite design and management.

The Committee has serious concerns that costs overruns and schedule delays have not only jeopardized the continuity of satellite observations, but NOAA itself. The Committee observes that the soaring cost of satellite observations is impacting NOAA's ocean and coastal management missions. This section would direct NOAA to take actions to manage the expense of environmental observations. NOAA would be allowed to purchase satellite components in block buys, rather than individually whenever possible. When assessing bids for satellite components, NOAA also would have to consider the overall value of the bid by assessing factors such as integration with current systems, continuity, and consistency. NOAA would be required to complete and operationalize its equatorial and polar microsatellite constellation; annual update reports would be required until NOAA completes this.

The Administrator of NOAA also would be required to include data from the Integrated Ocean Observing System into appropriate forecast models since ocean observations are critical for accurately predicting weather on all time scales. This section would require NOAA to identify degradation of existing monitoring and observation infrastructure that could lead to a reduction in forecast quality. For example, NOAA's failure to properly maintain buoys in the equatorial Pacific Ocean has hindered the agency's ability to provide El Niño forecasts.

This section also would require future satellites to be designed with an operational focus because NOAA has an obligation to provide regular, reliable, robust observations and accurate weather forecasts. However, less than half of the instruments from NOAA's next generation polar orbiting satellites will provide data for NWS weather models, and even those instruments that are providing data will be at a higher resolution than can be effectively utilized

by NWS weather models. This section would direct NOAA to enter into an agreement with the National Academy of Sciences to conduct a study on the future of NOAA satellite systems and, to the extent possible, follow any recommendations in that study and the report from the Weather Commission established in section 6. It is the Committee's hope that by actively engaging with the broader weather community, NOAA would develop a plan for a future satellite constellation that is more accurate, fiscally sustainable, and less fragile.

Section 5. Designation of Federal Coordinator for Meteorology.

This section would require the Director of the Office of Science and Technology to establish a Federal Coordinator for Meteorology.

Section 6. Establishment of the Weather Commission.

This section would establish a weather commission, which would provide a report on the highest priority weather forecast needs from the user community perspective in order to inform the National Academy of Sciences study mandated by section 4(b) on environmental data needs. The original intent of the Weather Commission was to encourage a robust dialogue by bringing together all weather stakeholders, private and public, in an open forum. Because of concerns raised by Federal agencies, the bill was amended to remove all government participation in the Weather Commission. It is the Committee's intention that the category of operational forecasters include those involved in providing business-to-business private commercial weather forecasts. NOAA may include additional non-government members on the Weather Commission that NOAA considers necessary. Such additional members do not need to come from the categories outlined in subsection (b)(1)(B). For example, NOAA could include representatives from companies that provide ground-based observations if the Administrator of NOAA considers that viewpoint is needed.

Section 7. Weather impacts to communities and infrastructure.

This section would require the NWS to review the resources it has to meet the specific needs of high density population center end users and provide a plan for how any unmet research, modeling, and forecasting needs can be addressed.

Section 8. Department of Defense weather forecasting activities.

This section would require NOAA to provide to Congress a report on the impacts of the proposed Air Force divestiture in the United States Weather Research and Forecasting Model.

Section 9. National Weather Service; operations and workforce analysis.

This section would require the NWS to conduct a baseline analysis of the NWS operations and workforce.

Section 10. Water resources.

This section would formally establish a National Water Center. The National Water Center may facilitate collaboration across the Federal and State governments, make recommendations to improve water resource management, improve water resource forecasts, and

facilitate the transition of water research into applications. NOAA, acting through the National Water Center, would improve operational water resource prediction products and collaborate with, and provide decision-support to, relevant Federal and State agencies with respect to total water predictions. The intention of this section is to codify existing activities rather than establishing a new program: the activities of the National Water Center described in this section are consistent with ongoing activities. This section would require the National Water Center to submit to the Assistant Secretary of the Army for Civil Works a report on total water predictive capabilities and products and how these capabilities and products would be used in the management of civil work projects, including the Central and Southern Florida Project and any project in the Apalachicola-Chattahoochee-Flint River System.

Section 11. Hurricane Forecast Improvement Project.

This section would require NOAA to maintain a project to improve hurricane forecasting. The goals of the project would be to develop and extend accurate hurricane forecasts and warnings in order to reduce loss of life, injury, and damage to the economy. NOAA also would be required to develop a plan to meet the goals of this section.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

FOOD SECURITY ACT OF 1985

[Public Law 99—198]

SEC. 1762. WEATHER AND CLIMATE INFORMATION IN AGRICULTURE.

[15 U.S.C. 313 note]

[(a)] (a) FINDINGS.— Congress finds that—

(1) agricultural and silvicultural operations are vulnerable to damage from atmospheric conditions that accurate and timely reporting of weather information can help prevent;

(2) the maintenance of current weather and climate analysis and information dissemination systems, and Federal, State, and private efforts to improve these systems, is essential if agriculture and silviculture are to mitigate damage from atmospheric conditions;

(3) agricultural and silvicultural weather services at the Federal level should be maintained with joint planning between the National Oceanic and Atmospheric Administration and the Department of Agriculture; and

(4) efforts should be made, involving user groups, weather and climate information providers, and Federal and State governments, to expand the use of weather and climate information in agriculture and silviculture.

[(b)] (b) POLICY.— It, therefore, is declared to be the policy of Congress that it is in the public interest to maintain an active Federal involvement in providing agricultural and silvicultural weath-

er and climate information and that efforts should be made, among users of this information and among private providers of this information, to improve use of this information.

(c) *FUNCTIONS.*—*The Under Secretary, through the National Weather Service and other appropriate programs in the National Oceanic and Atmospheric Administration, shall—*

(1) *collect and utilize information in order to make usable, reliable, and timely forecasts of seasonal temperature and precipitation;*

(2) *leverage existing research and models from the academic sector to improve the forecasts under paragraph (1);*

(3) *determine and provide information on how the forecasted conditions under paragraph (1) may impact—*

(A) *the number and severity of droughts, fires, tornadoes, hurricanes, floods, heatwaves, coastal inundation, winter storms, high impact weather, or other relevant natural disasters;*

(B) *snowpack; and*

(C) *sea ice conditions;*

(4) *provide the forecasts under paragraph (1) and the information under paragraphs (1) and (3) on both national and regional levels; and*

(5) *develop an Internet clearinghouse with the forecasts of seasonal temperature and precipitation and other relevant seasonal forecasts and products produced by the National Oceanic and Atmospheric Administration, other Federal and State departments and agencies, and the academic sector.*

(d) *COMMUNICATION.*—*The Under Secretary shall provide the forecasts and the information on their impacts under subsection (c) to the public, including public and private entities engaged in planning and preparedness, including—*

(1) *decisionmakers at the Federal, regional, State, tribal, and local levels of government;*

(2) *the private sector; and*

(3) *the public.*

(e) *COOPERATION.*—*The Under Secretary shall build upon existing forecasting and assessment programs and partnerships, including—*

(1) *by designating research and monitoring activities related to seasonal forecasts as a priority in 1 or more Cooperative Institute solicitations;*

(2) *by contributing to the interagency Earth System Prediction Capability; and*

(3) *by consulting with the Secretary of Defense and the Secretary of Homeland Security to determine the highest priority seasonal forecast needs to enhance national security.*

(f) *FORECAST COMMUNICATION COORDINATORS.*—

(1) *IN GENERAL.*—*The Under Secretary shall provide grants to States, including territories, for each State to have a forecast communication coordinator to receive and disseminate the forecasts and information under subsection (c). Applications for grants under this subsection shall be submitted in such form and manner, and contain such information, as the Under Secretary prescribes.*

(2) *REQUIREMENTS.*—*For each State that requests assistance under this subsection, the Under Secretary shall—*

- (A) provide funds to support an individual in that State to—
- (i) serve as a liaison among the National Oceanic and Atmospheric Administration, other Federal departments and agencies, the academic sector, the State, and relevant interests within that State; and
 - (ii) receive the forecasts and information under subsection (c) and disseminate the forecasts and information throughout the State, including county and tribal governments;
- (B) provide 1 grant for the purpose described in paragraph (1); and
- (C) require matching funds from the State, a university, a non-governmental organization, trade association, or the private sector.
- (3) *LIMITATION.*—Each grant under this subsection shall not exceed \$100,000.
- (g) *COOPERATION FROM OTHER FEDERAL AGENCIES.*—Each Federal department and agency shall cooperate as appropriate with the Under Secretary in carrying out this section.
- (h) *REPORTS.*—
- (1) *IN GENERAL.*—Not later than 18 months after the date of enactment of the Seasonal Forecasting Improvement Act, the Under Secretary shall transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report, including—
 - (A) an analysis of the how information from the National Oceanic and Atmospheric Administration on seasonal forecasts, as provided under subsection (c), is utilized in public planning and preparedness;
 - (B) specific plans and goals for the continued development of the seasonal forecasts and related products described in subsection (c); and
 - (C) an identification of research, monitoring, observing, and forecasting requirements to meet the goals described in subparagraph (B).
 - (2) *CONSULTATION.*—In developing the report under paragraph (1), the Under Secretary shall consult with relevant Federal, regional, State, tribal, and local government agencies, research institutions, and the private sector.
- (i) *AUTHORIZATION OF APPROPRIATIONS.*—There is authorized to be appropriated to carry out this section \$26,500,000 for each of fiscal years 2015 through 2020.
- (j) *DEFINITIONS.*—In this section:
- (1) *SEASONAL.*—The term “seasonal” means the time range between 2 weeks and 2 years.
 - (2) *UNDER SECRETARY.*—The term “Under Secretary” means the Under Secretary of Commerce for Oceans and Atmosphere.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
AUTHORIZATION ACT OF 1992

[Public Law 102—567]

SEC. 108. UNITED STATES WEATHER RESEARCH PROGRAM.

[15 U.S.C. 313 note]

(a) ESTABLISHMENT.—The Secretary of Commerce, in cooperation with the Federal Coordinating Council for Science, Engineering, and Technology through the Committee on Earth and Environmental Sciences, shall establish a United States Weather Research Program to—

(1) increase benefits to the Nation from the substantial investment in modernizing the public weather warning and forecast system in the United States;

(2) improve local and regional weather forecasts and warnings;

(3) address critical weather-related scientific issues[]; and[];

(4) coordinate governmental, university, and private-sector efforts[.];

(5) *provide to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives an annual report, including—*

(A) a list of on-going research projects, including project goals and a point of contact for each project; and

(B) the 5 projects related to observations, weather, or seasonal-scale forecasts within the Office of Oceanic and Atmospheric Research that are closest to operationalization, including for each project—

(i) the potential benefit;

(ii) any barrier to operationalization; and

(iii) the plan for operationalization, including which line office will financially support the project and how much the line office intends to spend;

(6) *establish teams with staff from the Office of Oceanic and Atmospheric Research and the National Weather Service to oversee the operationalization of research products developed by the Office of Oceanic and Atmospheric Research within the National Weather Service;*

(7) *develop mechanisms for the Office of Oceanic and Atmospheric Research's research priorities to be informed by both the relevant line offices within the National Oceanic and Atmospheric Administration, the relevant user community, and the weather enterprise, including by exchanging detailees between the Office of Oceanic and Atmospheric Research and the line offices;*

(8) *develop an internal mechanism to track the progress of each research project within the Office of Oceanic and Atmospheric Research and mechanisms to terminate a project that is not adequately progressing;*

(9) *for extramural research funded, the Office of Oceanic and Atmospheric Research shall develop and implement a system to track whether the grant's goals were accomplished;*

(10) *provide facilities for products developed by the Office of Oceanic and Atmospheric Research to be tested in operational simulations, such as test beds; and*

(11) *encourage academic collaboration with the Office of Oceanic and Atmospheric Research and the National Weather Service by facilitating visiting scholars.*

(b) IMPLEMENTATION PLAN.—【Not later than 90 days after the date of enactment of this Act, the】 *The* Secretary of Commerce, in cooperation with the Committee on Earth and Environmental Sciences, shall prepare and submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a plan for implementation of the United States Weather Research Program which shall —

(1) establish, for the 10-year period beginning in the year the plan is submitted, the goals and priorities for Federal weather research which most effectively advance the scientific understanding of weather processes and provide information to improve weather warning and forecast systems in the United States;

(2) describe specific activities, including research activities, data collection and data analysis requirements, predictive modeling, participation in international research efforts, demonstration of potential operational forecast applications, and education and training required to achieve such goals and priorities; and

(3) set forth the role of each Federal agency and department to be involved in the United States Weather Research Program, identifying and addressing, as appropriate, relevant programs and activities of the Federal agencies and departments that would contribute to such Program.