

112TH CONGRESS }
2d Session }

SENATE

{ REPORT
{ 112-266

NATIONAL HURRICANE RESEARCH
INITIATIVE ACT OF 2011

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 692



JANUARY 2, 2013.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

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¹The late Senator Inouye served on the Committee until his death on December 17, 2012.

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NATIONAL HURRICANE RESEARCH INITIATIVE ACT OF 2011

JANUARY 2, 2013.—Ordered to be printed

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

REPORT

[To accompany S. 692]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 692) to improve hurricane preparedness by establishing the National Hurricane Research Initiative, 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. 692, the National Hurricane Research Initiative Act of 2011, is to protect the public by establishing a coordinated research effort on hurricane prediction, resilient infrastructure, impact mitigation, public communication, and for other purposes.

BACKGROUND AND NEEDS

Hurricanes and the resulting storm surges, flooding, and high winds often lead to loss of life and property. Increases in population have made the Nation more vulnerable to hurricane damage. As of 2008, 29 percent of the U.S. population lived in coastline counties, an 84 percent increase from 1960.¹ Coastal areas are traditionally at high risk; however, damage from winds, flooding, storm surges, severe thunderstorms, tornadoes, and pressure fluctuations affect the entire Nation.

¹United States Department of Commerce & Economics and Statistics Administration, U.S. Census Bureau, *Coastline Population Trends in the U.S.: 1960–2008* (www.census.gov/prod/2010pubs/p25-1139.pdf)

According to the National Oceanic and Atmospheric Administration (NOAA), the average U.S. annual economic loss from 1900–2005 from hurricanes is about \$10 billion,² and the cumulative cost of hurricanes in the country totals hundreds of billions of dollars. The current trend suggests that as coastal populations continue to grow, bringing with them additional personal wealth, economic losses due to hurricanes will continue to double each decade.³ Between fiscal year 1989 and fiscal year 2008, Congress appropriated nearly \$271 billion through emergency supplementals and other spending bills in response to hurricane destruction.⁴

Recent hurricanes have been particularly costly. In 2003, Hurricane Isabel caused over \$3 billion in damages along the Atlantic Coast and resulted, directly or indirectly, in 34 deaths.⁵ In 2005, Hurricane Katrina resulted in \$125 billion in damages and over 1,833 reported deaths, making it the most expensive natural disaster in U.S. history.⁶ Hurricane Ike caused \$25 billion in damages and 20 deaths in the southeastern United States in 2008.⁷ While economic analyses of the most recent hurricane are still ongoing, Hurricane Sandy has been reported as responsible for at least 125 deaths and over \$62 billion in damages.⁸

Experts suggest that investment in a broad research portfolio including building codes, infrastructure, fundamental research, modeling, and monitoring could effectively mitigate losses due to extreme hurricane events. In a 2005 report, the National Science and Technology Council (NSTC) cites six grand challenges to improve the Nation's disaster resilience: (1) provide hazard and disaster information where and when it is needed; (2) understand the natural processes that produce hazards; (3) develop hazard mitigation strategies and technologies; (4) recognize and reduce vulnerability of interdependent critical infrastructure; (5) assess disaster resilience using standard methods; and (6) promote risk-wise behavior.⁹

The NSTC offers a combination of both research recommendations and technical goals to address these challenges. The report stresses the continued need for basic research into the causes and behaviors of storms and other severe weather events. The report also highlights the need to develop enhanced modeling techniques to enable improved assessments and analysis of infrastructure, urban planning, structural engineering, flood zones, and other vulnerable systems.

Population and economic growth in the 20th century has put unprecedented stress on existing critical infrastructure, reducing its resilience to withstand emergency use in a natural disaster. Even after the lessons learned in recent severe hurricanes, America's lev-

²Roger A. Pilke, Jr. et al. "Normalized Hurricane Damage in the United States: 1900–2005", *Natural Hazards Review* (2008).

³*Ibid.*

⁴Congressional Research Service Report RL33226, *Emergency Supplemental Appropriations Legislation for Disaster Assistance: Summary Data* (2008).

⁵National Hurricane Center, "Tropical Cyclone Report: Hurricane Isabel" (Revised: January 16, 2004).

⁶NOAA, "Hurricane Katrina: A Climatological Perspective" (Updated August 2006) (National Climatic Data Center Technical Report #2005–01).

⁷National Hurricane Center, "Tropical Cyclone Report: Hurricane Ike" (January 23, 2009) (AL092008).

⁸Associated Press, "Superstorm Sandy Deaths, Damage and Magnitude: What We Know One Month Later" (November 29, 2012).

⁹National Science and Technology Council, Committee on Environment and Natural Resources, Subcommittee on Disaster Reduction, *Grand Challenges for Disaster Reduction* (June 2005).

ees, bridges, wastewater, roads, and electrical grid all remain vulnerable to hurricane damage. The American Society of Civil Engineers' *2009 Report Card for America's Infrastructure* gave the United States a "D" grade and called for a \$2.2 trillion investment over five years to overcome the deficiencies.¹⁰ Hurricane-prone areas in particular require communication and transportation infrastructure in advance of extreme weather to alert the public to danger and carry out successful evacuations.

The National Academy of Sciences also identified disaster resiliency as an imperative to meet 21st century infrastructure needs.¹¹ Its 2009 report creates a framework for the nation to develop critical infrastructure with the ability to withstand and quickly recover from natural disasters. The components of the plan include: creating a broad and compelling vision; a focus on providing essential services involving water and wastewater, power, mobility, and connectivity; recognition of the interdependencies among critical infrastructure; a collaborative systems-based approach; and performance measures. The National Academy's findings reinforce the findings and recommendations of the NSTC report on the challenges for disaster resilience and necessary resources to address them.

This bill would establish a research program addressing the critical needs identified in both the NSTC and National Academy's reports to increase the understanding of hurricanes and their effects on infrastructure and the population, and improve the Nation's overall hurricane preparedness.

SUMMARY OF PROVISIONS

S. 692 would increase the understanding of and preparation for hurricanes by creating the National Hurricane Research Initiative. This Initiative would conduct research on hurricane prediction, infrastructure development, mitigation techniques, and communication as well as provide for training for the next generation of hurricane researchers and forecasters.

NOAA, working with the National Science Foundation (NSF), would establish a five-year implementation plan and subsequent research goals for the Initiative. NSF and NOAA would help to fulfill these objectives through merit-based research grant awards and training opportunities for future generations of hurricane researchers.

Every two years the Initiative would be required to submit to Congress, along with the President's budget request, a cross-cut budget and biennial report. NOAA and NSF would ensure public access to the work of the Initiative with workshops, conferences, and a public domain web site.

LEGISLATIVE HISTORY

Senator Bill Nelson introduced S. 692, the National Hurricane Research Initiative Act of 2011, on March 30, 2011. The bill was referred to the Senate Commerce, Science, and Transportation Committee. A companion bill, H.R. 2258, was introduced by Rep-

¹⁰American Society of Civil Engineers, *2009 Report Card for America's Infrastructure* (March 25, 2009).

¹¹National Academy of Sciences (National Research Council), *Sustainable Critical Infrastructure Systems: A Framework for Meeting 21st Century Imperatives* (2009).

representative Alcee L. Hastings and eight cosponsors in the House on June 21, 2011.

The Committee held a hearing on May 3, 2011 entitled “America’s Natural Disaster Preparedness: Are Federal Investments Paying Off?” to examine the Nation’s state of preparedness for natural disasters and how investments in programs such as the National Hurricane Research Initiative proposed by S. 692 would save lives and reduce reconstruction costs after future disasters. The witnesses were Dr. William Hooke, Senior Policy Fellow and Director, American Meteorological Society; Mr. Bob Ryan, Senior Meteorologist, ABC7/WJLA-TV; Dr. Anne Kiremidjian, Professor, Department of Civil and Environmental Engineering, Stanford University, on behalf of the American Society of Civil Engineers; and Dr. Clint Dawson P.E., Professor, Institute for Computational Engineering and Sciences, University of Texas at Austin. On May 5, 2011, the Commerce Committee met in open Executive Session and in a voice vote ordered that S. 692 be reported favorably with an amendment in the nature of a substitute.

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. 692—National Hurricane Research Initiative Act of 2011

Summary: S. 692 would direct the National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) to establish a program to conduct research related to hurricanes. The bill also would require NOAA to create a Web site to make information about hurricane research available to the public. Finally, the bill would direct NOAA and NSF to carry out a series of national workshops and conferences to facilitate hurricane research.

Based on information from the affected agencies and assuming appropriation of the necessary amounts, CBO estimates that implementing the legislation would cost \$375 million over the 2013–2017 period. Enacting S. 692 would not affect direct spending or revenues; therefore, pay-as-you-go procedures do not apply.

S. 692 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. 692 is shown in the following table. The costs of this legislation fall within budget functions 250 (general science, space, and technology) and 300 (natural resources and environment).

	By fiscal year, in millions of dollars—					
	2013	2014	2015	2016	2017	2013–2017
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Estimated Authorization Level	100	100	100	100	100	500
Estimated Outlays	29	67	87	94	98	375

Basis of estimate: For this estimate, CBO assumes that S. 692 will be enacted early in fiscal year 2013 and that the necessary amounts will be appropriated for each fiscal year. Estimated outlays are based on historical spending patterns for similar NOAA and NSF programs.

S. 692 would require NOAA and NSF to develop a national hurricane initiative that would fund research projects to improve hurricane forecasting and tracking, enhance storm surge models, and assess the impacts of hurricanes on physical infrastructure and people. Those agencies spent less than \$50 million annually on activities related to hurricane research in recent years. The bill also would require those agencies to develop a website to make hurricane research conducted under the program available to the public. Finally, the legislation would direct NOAA and NSF to conduct a series of national workshops to facilitate hurricane research. Based on information provided by the affected agencies and the National Science Board, CBO estimates that implementing the legislation would cost \$375 million over the 2013–2017 period, assuming appropriation of the necessary amounts. Most of those funds would be used to develop better hurricane observation equipment, improved modeling of hurricane behavior, and research on making buildings more resilient to hurricane damage.

Pay-As-You-Go considerations: None.

Intergovernmental and private-sector impact: S. 692 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

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

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

REGULATORY IMPACT STATEMENT

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

The reported bill would not subject any individuals or businesses affected by the bill to any additional regulations.

ECONOMIC IMPACT

S. 692 is not expected to have an adverse impact on the Nation's economy. Should the research authorized by this bill yield advances in hurricane prediction, mitigation, and/or infrastructure protection that are then deployed by Federal, State, or local governments, it is anticipated that these advances will result in cost savings to the public in the event of future hurricanes.

PRIVACY

The bill would have little, if any, impact on the personal privacy of individuals.

PAPERWORK

The reported bill would not increase paperwork requirements for private individuals or businesses. For the Federal Government, the bill would require an implementation plan along with biennial reports.

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 provide the title for the Act as the “National Hurricane Research Initiative Act of 2011.”

Section 2. Definitions.

This section would define the terms Eligible Entities, Indian Tribe, Initiative, State, Tribal Government, and Under Secretary.

Section 3. National Hurricane Research Initiative.

This section would direct the Under Secretary for Oceans and Atmosphere (the Under Secretary) to establish the National Hurricane Research Initiative (the Initiative). The purpose of the Initiative would be to conduct research to improve: (1) the understanding and prediction of hurricanes and other tropical storms; (2) the development of storm resilient infrastructure; (3) mitigation of the impacts on coastal populations, structures, and natural resources; and (4) communication with the public concerning hurricane forecasts and risks. The Initiative would also provide training for future hurricane researchers and forecasters.

Section 4. National Hurricane Research.

This section would direct NSF, in coordination with NOAA, to establish a competitive grant program through its merit review process to carry out the research described in section 3. NOAA would also carry out a research program to address the research objectives in section 3, which may include intramural research, grant awards, contracting with research entities, or cooperative agreements for research. It would also require interagency research collaboration and information sharing to the maximum extent practicable.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee states that the bill as reported would make no change to existing law.