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{ REPORT
119-26

TORNADO OBSERVATIONS RESEARCH AND
NOTIFICATION ASSESSMENT FOR DEVELOPMENT OF OPERATIONS ACT

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 258



JUNE 2, 2025.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED NINETEENTH CONGRESS

FIRST SESSION

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TORNADO OBSERVATIONS RESEARCH AND NOTIFICATION ASSESSMENT FOR DEVELOPMENT OF OPERATIONS ACT

JUNE 2, 2025.—Ordered to be printed

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

R E P O R T

[To accompany S. 258]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 258) to improve forecasting and understanding of tornadoes and other hazardous weather, and for other purposes, having considered the same, reports favorably thereon with amendments and recommends that the bill, as amended, do pass.

PURPOSE OF THE BILL

The purpose of S. 258, the Tornado Observations Research and Notification Assessment for Development of Operations (TORNADO) Act, is to improve forecasting and understanding of tornadoes and other hazardous weather, and for other purposes.

BACKGROUND AND NEEDS

Tornadoes are the fifth most deadly weather hazard, resulting in an average of 48 fatalities per year over the last 10 years.¹ Tornadoes are distinctively deadly events because they can form quickly without warning and may be visibly obscured by rain or clouds. While a tornado is on the ground, winds can reach up to 300 miles per hour. Damage tracks can be more than 1 mile wide and 50

¹“Hazard Statistics,” National Weather Service (https://www.weather.gov/media/hazstat/80years_2023.pdf).

miles long.² Around 1,200 tornadoes affect the United States yearly, but this is likely an underestimation due to discrepancies in reporting methods.³ While most people believe tornadoes only occur in the Midwest's Tornado Alley, they are present in all 50 States and can happen at any time of year.⁴ Tornadoes are as common in the Deep South as in the Great Plains.⁵ Overall, regions with greater population density, urban sprawl, and manufactured homes are particularly vulnerable.⁶

TORNADO RATING SCALE AND PUBLIC RESPONSE

The Fujita Scale (F-Scale) was initially developed based on the damage intensity of tornadoes. However, this did not account for observed wind speed. Since 2007, meteorologists have used the Enhanced Fujita Scale (EF Scale) to classify tornadoes based on wind speeds and related damage. Both scales are rated from 0 (weak; 65–85 mph winds) to 5 (violent; 200+ mph winds).⁷ An issue with this rating system is that many tornadoes move across rural areas with little infrastructure, meaning their recorded damage may not reflect their true strength.

The public is alerted to tornadoes through a tornado watch or warning.⁸ The National Oceanic and Atmospheric Administration (NOAA) issues a watch when the risk of a tornado is high but has not yet occurred. A warning is issued when a tornado occurs and there is a threat to life or property. Although understanding the difference between a tornado watch and a warning is crucial for a proper public response, at least a quarter of the individuals surveyed did not know the difference.⁹ Most advice from local weather stations is about sheltering in place at home, but when people are at a public location during a tornado, they are unaware of how to act safely. The combination of warning and location uncertainty poses a greater risk for inappropriate safety actions by the public.

RECENT TORNADO IMPACTS

In 2024, the United States saw 1,473 confirmed tornadoes, the second most on record. Major outbreaks in April, May, July, and December caused widespread destruction, with several EF-4 tornadoes hitting the Midwest and Great Plains. May was especially severe, with 527 tornadoes, nearly double the average. Hurricanes Debby, Helene, and Milton fueled additional tornado activity in the fall, including one of Florida's most significant outbreaks in decades. The year ended with a December outbreak in the Southeast, bringing 86 tornadoes, injuries, and fatalities. Tornadoes through-

²“Tornado Definition,” National Weather Service (<https://www.weather.gov/phi/TornadoDefinition>).

³“Severe Weather 101—Tornadoes: Tornado Basics,” NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/education/svrwx101/tornadoes/>).

⁴Supra no. 2.

⁵Matthew Cappucci, “Tornado Alley in the Plains Is an Outdated Concept. The South Is Even More Vulnerable, Research Shows,” *The Washington Post*, May 16, 2020 (<https://www.washingtonpost.com/weather/2020/05/16/tornado-alley-flawed-concept/>).

⁶Supra no. 3.

⁷“The Enhanced Fujita Scale (EF Scale),” National Weather Service (<https://www.weather.gov/oun/efscale>).

⁸“Understand Tornado Alerts,” National Weather Service (<https://www.weather.gov/safety/tornado-wv>).

⁹Jason Samenow, “The Problematic Confusion About Difference Between Tornado Watches and Warnings,” *The Washington Post*, May 2, 2011 (https://www.washingtonpost.com/blogs/capital-weather-gang/post/confusion-about-difference-between-tornado-watch-and-tornado-warnings-thats-a-problem/2011/05/02/AFW53ZaF_blog.html).

out the year caused significant damage to homes, businesses, and infrastructure nationwide.¹⁰

On March 31, 2023, 65 tornadoes swept across the Midwest and South, killing at least 32 people. There was significant damage and loss of life reported in Illinois, Arkansas, Alabama, Tennessee, Indiana, Mississippi, and even Delaware.¹¹ In Illinois, a theater roof caved in and left 1 person dead with 40 others injured. The severe storms also caused significant gas leaks and power outages.¹²

IMPORTANCE OF MONITORING AND FORECASTING TORNADOES

Alerting people before tornadoes cannot happen without monitoring for suitable conditions that lead to formation and funnel touch down. In the South, tornadoes are often difficult to see due to rain, clouds, and nighttime occurrence.¹³ Overnight tornadoes are 2.5 times more likely to kill than daytime tornadoes.¹⁴ Ample warning time and effective public communications are critical since people may be asleep or unable to see funnel formation. The NOAA Storm Prediction Center (SPC) monitors tornado-prone regions and issues daily forecasts.¹⁵ Local National Weather Service (NWS) forecast offices issue tornado warnings that inform area residents. Meteorologists at NOAA use multiple computer models at once, referred to as ensemble forecasting, to better predict weather.

However, there have been delays between the time NWS issues warnings and when the public can access them. This decreases the time people have to act in the event of a tornado. In Iowa, on March 5, 2022, 17 tornadoes swept across the State, causing loss of life and destruction of property. There was up to a 7-minute delay in a tornado warning notification to the public due to software and hardware issues at the national office.¹⁶ Advances in tornado monitoring and forecasting can increase warning time, but only if notifications can reach the public on time.

NOAA's National Severe Storms Laboratory (NSSL) conducts research to better understand how tornados form and to improve forecasts and warnings.¹⁷ The NSSL is involved with the Warn-on-Forecast research program that seeks to improve warning lead times for severe weather and water events by referencing high-resolution weather prediction models and high-performance computing.¹⁸ NSSL also utilizes unmanned aerial vehicles (UAVs) in their Targeted Observation by Radars and UAS of Supercells

¹⁰ NOAA National Centers for Environmental Information, *Monthly Tornadoes Report for Annual 2024, January 2025* (<https://www.ncei.noaa.gov/access/monitoring/monthly-report/tornadoes/202413>).

¹¹ Gwen Moritz et al., "At Least 32 Killed as Tornadoes Tear Through the Midwest and South," *The New York Times*, updated April 2, 2023 (<https://www.nytimes.com/2023/03/31/us/midwest-storms-flood-weather.html>).

¹² *Ibid.*

¹³ "Severe Weather 101—Tornadoes: Tornado Forecasting," NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/education/svrwx101/tornadoes/forecasting/>).

¹⁴ Matthew Cappucci, "Weather Service's Tornado Warnings Were Delayed During Deadly Iowa Outbreak," *The Washington Post*, March 6, 2022 (<https://www.washingtonpost.com/weather/2022/03/06/nws-tornado-warning-dissemination-iowa/>).

¹⁵ *Supra* no. 13.

¹⁶ *Supra* no. 14.

¹⁷ "NSSL Research: Tornadoes," NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/research/tornadoes/>).

¹⁸ "Warn on Forecast," NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/projects/wof/>).

(TORUS) project.¹⁹ UAVs can safely observe features near the ground that may be key in tornado formation. To improve hazard communication to the public, NSSL has created the Forecasting a Continuum of Environmental Threats (FACETs) framework.²⁰ FACETs aims to modernize weather forecasting and warnings by incorporating evolving technology and developing user-specific, clear, and simple communication methods that will better serve the public during hazardous weather events.

THE ROLE OF RESEARCH UNIVERSITIES IN IMPROVING TORNADO FORECASTS AND WARNINGS

Improvements and advances in tornado forecasting and warnings would not be possible without the collaboration between Federal agencies and research universities. NOAA Cooperative Institutes are academic and nonprofit research institutions that conduct research supporting NOAA's goals and strategic plans.²¹ This program includes 80 universities and research institutions in 33 States, the District of Columbia, and U.S. territories. Additionally, NOAA Research Laboratories establish collaborative agreements with universities to develop joint research institutes that are hubs for leading research on atmospheric and earth sciences.²² At one NOAA Research Laboratory, the National Severe Storms Laboratory (NSSL), the TORUS project is led by the University of Nebraska-Lincoln in partnership with NOAA, the University of Oklahoma Cooperative Institute for Mesoscale Meteorological Studies, Texas Tech, and the University of Colorado Boulder.

SUMMARY OF PROVISIONS

S. 258 would do the following:

- Establish or designate a hazard risk communication office to improve the communication of severe weather alerts, more clearly inform action, and increase the likelihood that the public takes appropriate action to prevent loss of life or property.
- Require NOAA to prepare and submit an action plan for the national implementation of high-resolution probabilistic guidance for tornado forecasting and prediction.
- Encourage NOAA to evaluate the current tornado rating system and make updates.
- Require NOAA to coordinate with appropriate entities for post-storm assessments to optimize data collection, sharing, and integration.
- Require NOAA to provide training, resources, and access to professional counseling to support the mental health of employees conducting post-storm assessments.

LEGISLATIVE HISTORY

S. 258, the TORNADO Act, was introduced on January 27, 2025, by Senator Wicker (for himself and Senators Hyde-Smith, Grassley,

¹⁹“TORUS: Targeted Observations by Radars and UAS of Supercells,” NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/projects/torus/>).

²⁰“FACETs,” NOAA National Severe Storms Laboratory (<https://www.nssl.noaa.gov/projects/facets/>).

²¹“Cooperative Institutes,” NOAA (<https://ci.noaa.gov/>).

²²“NOAA Research Laboratories,” NOAA (<https://ci.noaa.gov/research-themes/noaa-research-laboratories/>).

Moran, Sheehy, Young, Cruz, Peters, and Warnock) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. Senator Blackburn is an additional cosponsor. On February 5, 2025, the Committee met in open Executive Session and, by voice vote, ordered S. 258 to be reported favorably with an amendment.

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S. 1284, the TORNADO Act, was introduced on April 25, 2023, by Senator Wicker (for himself and Senators Cruz, Thune, Grassley, Hyde-Smith, Young, Blackburn, Boozman, and Peters) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On May 10, 2023, the Committee met in open Executive Session and, by voice vote, ordered S. 1284 to be reported favorably with an amendment (in the nature of a substitute). Senators Moran and Warnock were later added as cosponsors.

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S. 3817, the TORNADO Act, was introduced on March 10, 2022, by Senator Wicker (for himself and Senators Grassley, Hyde-Smith, Thune, and Ernst) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On March 22, 2022, the Committee met in open Executive Session and, by voice vote, ordered S. 3817 to be reported favorably with an amendment (in the nature of a substitute). Senators Duckworth, Cruz, and Peters were later added as cosponsors.

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. 258, TORNADO Act			
As ordered reported by the Senate Committee on Commerce, Science, and Transportation on February 5, 2025			
By Fiscal Year, Millions of Dollars	2025	2025-2030	2025-2035
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	4	74	not estimated
Increases <i>net direct spending</i> in any of the four consecutive 10-year periods beginning in 2036?	No	Statutory pay-as-you-go procedures apply? No	
		Mandate Effects	
Increases <i>on-budget deficits</i> in any of the four consecutive 10-year periods beginning in 2036?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

S. 258 would direct the National Oceanic and Atmospheric Administration (NOAA) to improve forecasting of and warnings about hazardous weather. The bill also would require NOAA to initiate

a pilot program for communicating tornado hazards. Finally, the bill would require the Government Accountability Office (GAO) to report on the National Weather Service's information technology infrastructure.

The costs of the legislation, detailed in Table 1, fall within budget function 300 (natural resources and environment).

CBO assumes that S. 258 will be enacted in fiscal year 2025 and that the authorized and estimated amounts will be available in each year. Based on historical spending patterns, CBO estimates that implementing the bill would cost \$74 million over the 2025–2030 period, as described below.

VORTEX–USA: The bill would authorize the appropriation of \$11 million annually from 2025 through 2032 for VORTEX–USA (Verification of the Origins of Rotation in Tornadoes Experiment) to develop accurate and timely tornado forecasts, predictions, and warnings. In 2024, NOAA allocated \$11 million to the project. CBO estimates that implementing this provision would cost \$59 million over the 2025–2030 period and \$28 million after 2030, assuming appropriation of the authorized amounts.

Other Activities: Using information from NOAA, CBO estimates that the pilot program would require four full-time employees and one cooperative agreement with a research university at a total cost of \$15 million over the 2025–2030 period. Most of that cost would be for the cooperative agreement. CBO also estimates that the GAO report would cost less than \$500,000. Any related spending would be subject to the availability of appropriated funds.

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 258

	By fiscal year, millions of dollars—						
	2025	2026	2027	2028	2029	2030	2025–2030
VORTEX–USA							
Authorization	11	11	11	11	11	11	66
Estimated Outlays	3	10	12	12	11	11	59
Other Activities							
Estimated Authorization	1	3	3	3	3	3	16
Estimated Outlays	1	2	3	3	3	3	15
Total Changes							
Estimated Authorization	12	14	14	14	14	14	82
Estimated Outlays	4	12	15	15	14	14	74

The CBO staff contacts for this estimate are Aurora Swanson and Johnny Willing. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

PHILLIP L. SWAGEL,
Director, Congressional Budget Office.

REGULATORY IMPACT STATEMENT

Because S. 258 does not create any new programs, the legislation will have no additional regulatory impact, and will result in no additional reporting requirements. The legislation will have no further effect on the number or types of individuals and businesses regulated, the economic impact of such regulation, the personal privacy of affected individuals, or the paperwork required from such individuals and businesses.

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 that the bill may be cited as the “Tornado Observations Research and Notification Assessment for Development of Operations Act” or the “TORNADO Act”.

Section 2. Definitions.

This section would define the terms “hazardous weather and water events”, “historically Black college or university”, “Indian Tribe”, “institution of higher education”, “National Laboratory”, and “Under Secretary”.

Section 3. Hazardous weather and water event risk communication.

This section would require maintaining and improving NOAA’s systems for hazardous weather and water event communications to prevent loss of life and property. It would create a hazard risk communication office (Office) to simplify and improve hazard communications. The Office would develop a plan to enhance public hazard communications, create metrics to track their impact on public action, and periodically update the plan based on research and metrics. The Office would also implement recommendations tailored to vulnerable populations and based on social, behavioral, risk, and communication science, responding to the needs of Federal, State, and local partners and various hazard types. To assess effectiveness, the Office would collaborate with Federal partners including National Laboratories and Cooperative Institutes, State and local governments, Indian Tribes, educational institutions, and media partners. Data from the Office would be accessible via a central repository system.

This section would require NOAA to establish or maintain a hazard communication research program to modernize the creation of hazard information and responses to hazardous weather and water events. NOAA would coordinate with States, Indian Tribes, localities, and emergency managers on research priorities and results and establish a tornado hazard communication pilot program to evaluate the research.

This section would require NOAA to maintain a central repository for NOAA data on hazardous weather and water event communications, including social, behavioral, risk, and economic research, and develop methods to prevent tampering with online hazard communications.

Section 4. Warn-on-forecast strategic plan.

This section would require the Under Secretary to prepare and submit to Congress a plan to develop and implement a high-resolution probabilistic forecast and warning system for hazardous weather and water events no later than 1 year after enactment. The plan would include priorities for vulnerable populations, im-

proved forecasting methodologies and modeling, and risk communication research.

Section 5. Tornado rating system.

This section would require NOAA to evaluate the current rating system for tornado severity, determine if updates are needed, and implement necessary changes.

Section 6. Post-storm surveys and assessments.

This section would require NOAA to perform one or more post-storm surveys and assessments following significant hazardous weather or water events. Surveys would be coordinated with Federal, State, local, and Tribal governments; institutions of higher education; and private entities to optimize data collection, sharing, and integration. Survey data would be made available to the public after storm surveys. NOAA would improve the post-storm survey, assessment methods, and data collection. Training, resources, and counseling would be available to staff conducting post-storm surveys and assessments.

Section 7. VORTEX-USA program.

This section would require the maintenance of a program for improving tornado forecasts and warnings. NOAA would be required to award research grants that improve risk communication and STEM related to tornadoes, prioritizing research completed at minority-serving institutions. This section would authorize appropriations of \$11 million for each of fiscal years 2025 through 2032.

Section 8. Government Accountability Office report on hazardous weather and water alert dissemination.

This section would require the Government Accountability Office (GAO) to create a report examining the information technology infrastructure of NWS of NOAA. The report would focus on the structure of the hazardous weather and water alert system and assess if alerts are disseminated to the public in a timely and efficient manner. GAO would be required to submit the report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives no later than 540 days after enactment.

Section 9. Elimination of certain report requirements.

This section would eliminate an outdated report on information systems at NWS.

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):

WEATHER RESEARCH AND FORE- CASTING INNOVATION ACT OF 2017

* * * * *

[15 U.S.C. 8513]

SEC. 103. [TORNADO WARNING IMPROVEMENT AND EXTENSION PROGRAM] VORTEX-USA.

(a) **IN GENERAL.**—The Under Secretary, in collaboration with the United States weather industry and academic partners, shall [establish a tornado warning improvement and extension program] *maintain a program for rapidly improving tornado forecast and warnings.*

(b) * * *

(c) * * *

(d) **WARNINGS.**—*The program required by subsection (a) shall—*

(1) *continue the research necessary to develop and deploy probabilistic weather forecast guidance technology for tornadoes; and*

(2) *incorporate, as appropriate, hazard communication research.*

(e) **RESEARCH.**—

(1) **IN GENERAL.**—*The Under Secretary shall, through the program required by subsection (a), award grants for research that focuses on improving—*

(A) *the social, behavioral, risk, communication, and economic sciences related to vulnerabilities, risk communication, and delivery of information critical for saving lives and property related to tornadoes; and*

(B) *the physical sciences, engineering, and technology related to tornado formation, the interactions of tornadoes with the built and natural environment, and the interaction of tornadoes and hurricanes.*

(2) **PRIORITY INSTITUTIONS.**—

(A) **IN GENERAL.**—*In awarding grants under paragraph (1), the Under Secretary may prioritize awarding grants to minority-serving institutions.*

(B) **DEFINITION OF MINORITY-SERVING INSTITUTION.**—*In this paragraph, the term “minority-serving institution” means—*

(i) *a part B institution (as defined in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061));*

(ii) *a Hispanic-serving institution (as defined in section 502(a) of that Act (20 U.S.C. 1101a(a)));*

(iii) *a Tribal College or University (as defined in section 316(b) of that Act (20 U.S.C. 1059c(b)));*

(iv) *an Alaska Native-serving institution (as defined in section 317(b) of that Act (20 U.S.C. 1059d(b)));*

(v) *a Native Hawaiian-serving institution (as defined in section 317(b) of that Act (20 U.S.C. 1059d(b)));*

(vi) *a Predominantly Black Institution (as defined in section 318(b) of that Act (20 U.S.C. 1059e(b)));*

(vii) *an Asian American and Native American Pacific Islander-serving institution (as defined in section 320(b) of that Act (20 U.S.C. 1059g(b))); or*

(viii) a Native American-serving, nontribal institution (as defined in section 319(b) of that Act (20 U.S.C. 1059f(b))).

[(d)](f) PROGRAM PLAN.—Not later than 180 days after the date of the enactment of this Act, the Assistant Administrator for Oceanic and Atmospheric Research, in coordination with the Director of the National Weather Service, 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.

[(e)](g) ANNUAL BUDGET FOR PLAN SUBMITTAL.—Following completion of the plan, the Under Secretary, acting through the Assistant Administrator for Oceanic and Atmospheric Research and in coordination with the Director of the National Weather Service, shall, not less frequently than once each year, submit to Congress a proposed budget corresponding with the activities identified in the plan.

(h) AUTHORIZATION OF APPROPRIATIONS.—*There is authorized to be appropriated to the Under Secretary to carry out this section \$11,000,000 for each of fiscal years 2025 through 2032, of which not less than \$2,000,000 each fiscal year shall be used for grants awarded under subsection (e).*

* * * * *

[15 U.S.C. 8543]

SEC. 8543. OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH AND NATIONAL WEATHER SERVICE EXCHANGE PROGRAM.

(a) IN GENERAL.—The Assistant Administrator for Oceanic and Atmospheric Research and the Director of *the* National Weather Service may establish a program to detail Office of Oceanic and Atmospheric Research personnel to the National Weather Service and National Weather Service personnel to the Office of Oceanic and Atmospheric Research.

(b) * * *

(c) * * *

[(d)] ANNUAL REPORT.—Not less frequently than once each year, the Under Secretary shall 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 report on participation in such program and shall highlight any innovations that come from this interaction.】

* * * * *

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AUTHORIZATION ACT OF 1992

* * * * *

[15 U.S.C. 1537; Public Law 102–567; 106 Stat. 4274]

SEC. 106. DATA AND INFORMATION SYSTEMS.

(a) * * *

(b) * * *

[(c) NEEDS ASSESSMENT FOR DATA MANAGEMENT, ARCHIVAL, AND DISTRIBUTION.—(1) Not later than 12 months after the date of enactment of this Act and at least biennially thereafter, the Secretary of Commerce shall complete an assessment of the adequacy of the environmental data and information systems of the National Oceanic and Atmospheric Administration. In conducting such an assessment, the Secretary shall take into consideration the need to—

[(A) provide adequate capacity to manage, archive, and disseminate environmental data and information collected and processed, or expected to be collected and processed, by the National Oceanic and Atmospheric Administration and other appropriate departments and agencies;

[(B) establish, develop, and maintain information bases, including necessary management systems, which will promote consistent, efficient, and compatible transfer and use of data;

[(C) develop effective interfaces among the environmental data and information systems of the National Oceanic and Atmospheric Administration and other appropriate departments and agencies;

[(D) develop and use nationally accepted formats and standards for data collected by various national and international sources; and

[(E) integrate and interpret data from different sources to produce information that can be used by decisionmakers in developing policies that effectively respond to national and global environmental concerns.

[(2) Not later than 12 months after the date of enactment of this Act and biennially thereafter, the Secretary of Commerce shall develop 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 comprehensive plan, based on the assessment under paragraph (1), to modernize and improve the environmental data and information systems of the National Oceanic and Atmospheric Administration. The report shall—

[(A) set forth modernization and improvement objectives for the 10-year period beginning with the year in which the plan is submitted, including facility requirements and critical new technological components that would be necessary to meet the objectives set forth;

[(B) propose specific agency programs and activities for implementing the plan;

[(C) identify the data and information management, archival, and distribution responsibilities of the National Oceanic and Atmospheric Administration with respect to other Federal departments and agencies and international organizations, including the role of the National Oceanic and Atmospheric Administration with respect to large data systems like the Earth Observing System Data and Information System; and

[(D) provide an implementation schedule and estimate funding levels necessary to achieve modernization and improvement objectives.]

* * * * *

