

Calendar No. 88

119TH CONGRESS
1ST SESSION**S. 258****[Report No. 119–26]**

To improve forecasting and understanding of tornadoes and other hazardous weather, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JANUARY 27, 2025

Mr. WICKER (for himself, Mrs. HYDE-SMITH, Mr. GRASSLEY, Mr. MORAN, Mr. SHEEHY, Mr. YOUNG, Mr. CRUZ, Mr. PETERS, Mr. WARNOCK, and Mrs. BLACKBURN) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

JUNE 2, 2025

Reported by Mr. CRUZ, with amendments

[Omit the parts struck through and insert the parts printed in *italic*]**A BILL**

To improve forecasting and understanding of tornadoes and other hazardous weather, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Tornado Observations
3 Research and Notification Assessment for Development of
4 Operations Act” or the “TORNADO Act”.

5 **SEC. 2. DEFINITIONS.**

6 In this Act:

7 (1) **HAZARDOUS WEATHER AND WATER**
8 **EVENTS.**—The term “hazardous weather and water
9 events” means weather and water events that have
10 a high risk of loss of life or property, including—

11 (A) severe storms, such as hurricanes and
12 short-fused, small-scale hazardous weather or
13 hydrologic events produced by thunderstorms,
14 including large hail, damaging winds, torna-
15 does, and flash floods;

16 (B) winter storms, such as freezing or fro-
17 zen precipitation (including freezing rain, sleet,
18 and snow), or combined effects of freezing or
19 frozen precipitation and strong winds; and

20 (C) other weather hazards, such as ex-
21 treme heat or cold, wildfire, drought, dense fog,
22 high winds, river flooding, and lakeshore flood-
23 ing.

24 (2) **HISTORICALLY BLACK COLLEGE OR UNI-**
25 **VERSITY.**—The term “historically Black college or
26 university” has the meaning given the term “part B

1 institution” in section 322 of the Higher Education
 2 Act of 1965 (20 U.S.C. 1061).

3 (3) INDIAN TRIBE.—The term “Indian Tribe”
 4 has the meaning given the term in section 4 of the
 5 Indian Self-Determination and Education Assistance
 6 Act (25 U.S.C. 5304).

7 (4) INSTITUTION OF HIGHER EDUCATION.—The
 8 term “institution of higher education” has the
 9 meaning given the term in section 101(a) of the
 10 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

11 (5) NATIONAL LABORATORY.—The term “Na-
 12 tional Laboratory” has the meaning given the term
 13 in section 2 of the Energy Policy Act of 2005 (42
 14 U.S.C. 15801).

15 (6) UNDER SECRETARY.—The term “Under
 16 Secretary” means the Under Secretary of Commerce
 17 for Oceans and Atmosphere.

18 **SEC. 3. HAZARDOUS WEATHER AND WATER EVENT RISK**
 19 **COMMUNICATION.**

20 (a) IN GENERAL.—The Under Secretary shall main-
 21 tain and improve the system of the National Oceanic and
 22 Atmospheric Administration by which the risks of haz-
 23 ardous weather and water events are communicated to the
 24 general public, with the goal of informing action and en-
 25 couraging response to prevent loss of life and property.

1 (b) HAZARD RISK COMMUNICATION IMPROVEMENT
2 AND SIMPLIFICATION.—

3 (1) IN GENERAL.—The Under Secretary shall
4 maintain a hazard risk communication office (in this
5 subsection referred to as the “Office”), for the pur-
6 poses of simplifying and improving the communica-
7 tion of hazardous weather and water event risks.

8 (2) TERMINOLOGY.—The Office shall identify,
9 eliminate, or modify unnecessary, redundant, or con-
10 fusing terms for hazardous weather and water event
11 communications and add new terminology, as appro-
12 priate.

13 (3) COMMUNICATIONS IMPROVEMENT.—The Of-
14 fice shall improve the form, content, and methods of
15 hazardous weather and water event communications
16 to more clearly inform action and increase the likeli-
17 hood that the public takes such action to prevent the
18 loss of life or property.

19 (4) EVALUATIONS.—The Office shall, in coordi-
20 nation with the performance branch of the National
21 Weather Service, develop metrics for that branch to
22 track and evaluate the degree to which hazardous
23 weather and water event communications inform ac-
24 tion and encourage response.

25 (5) SUPPORT PLAN.—

1 (A) IN GENERAL.—The Office shall de-
2 velop a plan for the purpose of supporting the
3 activities described in paragraph (3).

4 (B) PERIODIC UPDATE AND ELEMENTS.—
5 The plan developed under subparagraph (A)
6 shall be periodically updated and informed by
7 internal and extramural research and the re-
8 sults of the evaluation of hazardous weather
9 and water event communications conducted
10 under paragraph (4).

11 (6) METHODS.—In carrying out this subsection,
12 the Office shall develop and implement recommenda-
13 tions that—

14 (A) are based on the best and most recent
15 understanding from social, behavioral, risk, and
16 communication science research;

17 (B) are validated by social, behavioral,
18 risk, and communication science, taking into ac-
19 count the importance of methods that support
20 reproduction and replication of scientific stud-
21 ies, use of rigorous statistical analyses, and, as
22 applicable, data analysis supported by artificial
23 intelligence and machine learning technologies;

1 (C) account for the needs of various demo-
 2 graphics, vulnerable populations, and geo-
 3 graphic regions;

4 (D) account for the differences between
 5 various types of weather and water hazards;

6 (E) respond to the needs of Federal, State,
 7 and local government partners and media part-
 8 ners; ~~and~~

9 *(F) account for the need for enhanced or*
 10 *earlier communication of a hazardous weather*
 11 *event to inform action and encourage response*
 12 *when the event occurs in a geographic area*
 13 *where the event is historically abnormal; and*

14 ~~(F)~~(G) account for necessary changes in
 15 the infrastructure, technology, and protocols for
 16 creating and disseminating federally operated
 17 watches and warnings.

18 (7) COORDINATION.—In implementing this sub-
 19 section, the Office shall coordinate with—

20 (A) Federal partners, including National
 21 Laboratories, Cooperative Institutes, and re-
 22 gional integrated sciences and assessments pro-
 23 grams;

24 (B) State and local government partners;

25 (C) Indian Tribes;

1 (D) institutions of higher education; and

2 (E) media partners.

3 (8) TIMELINESS AND CONSISTENCY.—The Of-
 4 fice shall develop best practices and guidance for en-
 5 suring timely and consistent communication across
 6 public facing platforms that disseminate hazardous
 7 weather and water event information.

8 (c) HAZARD COMMUNICATION RESEARCH AND EN-
 9 GAGEMENT.—

10 (1) IN GENERAL.—The Under Secretary shall
 11 establish or maintain a research program—

12 (A) to modernize the creation and commu-
 13 nication of risk-based, statistically reliable,
 14 probabilistic hazard information, with the goal
 15 of informing effective actions and encouraging
 16 responses to hazardous weather and water
 17 events; and

18 (B) to improve the fundamental social, be-
 19 havioral, risk, and communication science re-
 20 garding hazardous weather and water event
 21 communication.

22 (2) COORDINATION.—In carrying out the re-
 23 search program required by paragraph (1), the
 24 Under Secretary shall coordinate and communicate

1 with States, Indian Tribes, localities, and emergency
2 managers on research priorities and results.

3 (3) PILOT PROGRAM FOR TORNADO HAZARD
4 COMMUNICATION REQUIRED.—

5 (A) IN GENERAL.—To further research
6 into hazard communication, the Under Sec-
7 retary, in collaboration with one or more eligible
8 institutions, shall establish a pilot program for
9 tornado hazard communication to test the effec-
10 tiveness of implementing the research conducted
11 under this subsection with respect to tornadoes.

12 (B) ELIGIBLE INSTITUTION DEFINED.—In
13 this paragraph, the term “eligible institution”
14 means any of the following:

15 (i) A historically Black college or uni-
16 versity located in an area of persistent pov-
17 erty that is subjected to frequent severe
18 weather, such as tornadoes, hurricanes,
19 and floods.

20 (ii) An institution of higher education
21 in close proximity to a Weather Forecast
22 Office of the National Weather Service.

23 (d) DATA MANAGEMENT.—The Under Secretary
24 shall establish, maintain, and improve a central repository
25 system for the National Oceanic and Atmospheric Admin-

1 istration for social, behavioral, risk, and economic data re-
2 lated to the communication of hazardous weather and
3 water events, including data developed or received pursu-
4 ant to paragraphs (3), (4), and (5) of subsection (b).

5 (e) **DIGITAL WATERMARKING.**—The Under Secretary
6 shall develop methods to reduce the likelihood of unauthor-
7 ized tampering with online hazardous weather and water
8 event risk communication, such as developing digital wa-
9 termarks.

10 **SEC. 4. WARN-ON-FORECAST STRATEGIC PLAN.**

11 (a) **IN GENERAL.**—Not later than one year after the
12 date of the enactment of this Act, the Under Secretary
13 shall prepare and submit to Congress a strategic plan for
14 developing and prioritizing the implementation of high-
15 resolution probabilistic forecast guidance for hazardous
16 weather and water events using a next-generation weather
17 forecast and warning framework.

18 (b) **PLAN ELEMENTS.**—The strategic plan required
19 by subsection (a) shall include the following:

20 (1) A discussion of—

21 (A) the priorities and needs of vulnerable
22 populations and National Weather Service part-
23 ners; and

24 (B) high-performance computing, visualiza-
25 tion, and dissemination needs.

1 (2) A timeline and guidance for implementation
 2 of—

3 (A) high-resolution numerical weather pre-
 4 diction models;

5 (B) methods for meeting the high-perform-
 6 ance computing, visualization, and dissemina-
 7 tion needs discussed under paragraph (1)(B);

8 (C) real-time high-resolution probabilistic
 9 forecasts;

10 (D) improved observations, including
 11 through radars, satellites, and uncrewed aerial
 12 systems;

13 (E) a flexible framework to communicate
 14 clear and simple hazardous weather and water
 15 event information to the public; ~~and~~

16 *(F) improved coordination among offices of*
 17 *the National Weather Service, such as the Na-*
 18 *tional Hurricane Center, the River Forecast Cen-*
 19 *ters, and forecast offices of the National Weather*
 20 *Service, to reduce the occurrence of disparate*
 21 *weather predictions and to better communicate*
 22 *the relationship between overlapping weather*
 23 *forecasts for different periods of time; and*

24 ~~(F)~~(G) social, behavioral, risk, and commu-
 25 nication research to improve the forecaster

1 operational environment and societal informa-
2 tion reception and response.

3 **SEC. 5. TORNADO RATING SYSTEM.**

4 (a) IN GENERAL.—The Under Secretary shall, in col-
5 laboration with such stakeholders as the Under Secretary
6 considers appropriate—

7 (1) evaluate the system used as of the date of
8 the enactment of this Act to rate the severity of tor-
9 nadoes; and

10 (2) determine whether updates to that system
11 are required to ensure that the ratings accurately re-
12 flect the severity of tornadoes.

13 (b) UPDATE REQUIRED.—If the Under Secretary de-
14 termines under subsection (a) that updates to the tornado
15 rating system are necessary, the Under Secretary shall up-
16 date the system.

17 **SEC. 6. POST-STORM SURVEYS AND ASSESSMENTS.**

18 (a) IN GENERAL.—The Under Secretary shall per-
19 form one or more post-storm surveys and assessments fol-
20 lowing each hazardous weather or water event determined
21 by the Under Secretary to be of sufficient societal impor-
22 tance to warrant a post-event survey and assessment.

23 (b) COORDINATION.—The Under Secretary shall co-
24 ordinate with Federal, State, and local governments, In-
25 dian Tribes, private entities, and relevant institutions of

1 higher education when conducting post-storm surveys and
2 assessments under subsection (a) in order to optimize data
3 collection, sharing, and integration.

4 (c) DATA AVAILABILITY.—The Under Secretary shall
5 make the data obtained from each post-storm survey and
6 assessment conducted under subsection (a) available to the
7 public as soon as practicable after conducting the survey
8 and assessment.

9 (d) IMPROVEMENT.—The Under Secretary shall—

10 (1) investigate the role of uncrewed aerial sys-
11 tems in data collection during post-storm surveys
12 and assessments conducted under subsection (a);

13 (2) identify gaps in and update tactics and pro-
14 cedures to enhance the efficiency and reliability of
15 data obtained from post-storm surveys and assess-
16 ments; and

17 (3) increase the number of post-storm commu-
18 nity impact studies, including by—

19 (A) surveying individual responses;

20 (B) conducting review of the accuracy of
21 prior risk evaluations;

22 (C) evaluating the efficacy of prior mitiga-
23 tion activity; and

24 (D) gathering survivability statistics.

1 (e) SUPPORT FOR EMPLOYEES.—The Under Sec-
 2 retary shall provide training, resources, and access to pro-
 3 fessional counseling to support the emotional and mental
 4 health and well-being of employees conducting post-storm
 5 surveys and assessments under subsection (a).

6 **SEC. 7. VORTEX-USA PROGRAM.**

7 (a) IN GENERAL.—Section 103 of the Weather Re-
 8 search and Forecasting Innovation Act of 2017 (15 U.S.C.
 9 8513) is amended—

10 (1) in the section heading, by striking “**TOR-**
 11 **NADO WARNING IMPROVEMENT AND EXTEN-**
 12 **SION**” and inserting “**VORTEX-USA**”;

13 (2) in subsection (a), by striking “establish a
 14 tornado warning improvement and extension pro-
 15 gram” and inserting “maintain a program for rap-
 16 idly improving tornado forecast and warnings”;

17 (3) by redesignating subsections (d) and (e) as
 18 subsections (f) and (g), respectively;

19 (4) by inserting after subsection (c) the fol-
 20 lowing:

21 “(d) WARNINGS.—The program required by sub-
 22 section (a) shall—

23 “(1) continue the research necessary to develop
 24 and deploy probabilistic weather forecast guidance
 25 technology for tornadoes; and

1 “(2) incorporate, as appropriate, hazard com-
2 munication research.

3 “(e) RESEARCH.—

4 “(1) IN GENERAL.—The Under Secretary shall,
5 through the program required by subsection (a),
6 award grants for research that focuses on improv-
7 ing—

8 “(A) the social, behavioral, risk, commu-
9 nication, and economic sciences related to
10 vulnerabilities, risk communication, and delivery
11 of information critical for saving lives and prop-
12 erty related to tornadoes; and

13 “(B) the physical sciences, engineering,
14 and technology related to tornado formation,
15 the interactions of tornadoes with the built and
16 natural environment, and the interaction of tor-
17 nadoes and hurricanes.

18 “(2) PRIORITY INSTITUTIONS.—

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

23 “(B) DEFINITION OF MINORITY-SERVING
24 INSTITUTION.—In this paragraph, the term ‘mi-
25 nority-serving institution’ means—

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

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

7 “(iii) a Tribal College or University
8 (as defined in section 316(b) of that Act
9 (20 U.S.C. 1059c(b)));

10 “(iv) an Alaska Native-serving institu-
11 tion (as defined in section 317(b) of that
12 Act (20 U.S.C. 1059d(b)));

13 “(v) a Native Hawaiian-serving insti-
14 tution (as defined in section 317(b) of that
15 Act (20 U.S.C. 1059d(b)));

16 “(vi) a Predominantly Black Institu-
17 tion (as defined in section 318(b) of that
18 Act (20 U.S.C. 1059e(b)));

19 “(vii) an Asian American and Native
20 American Pacific Islander-serving institu-
21 tion (as defined in section 320(b) of that
22 Act (20 U.S.C. 1059g(b))); or

23 “(viii) a Native American-serving,
24 nontribal institution (as defined in section

1 319(b) of that Act (20 U.S.C.
2 1059f(b))).”; and

3 (5) by adding at the end the following:

4 “(h) AUTHORIZATION OF APPROPRIATIONS.—There
5 is authorized to be appropriated to the Under Secretary
6 to carry out this section \$11,000,000 for each of fiscal
7 years 2025 through 2032, of which not less than
8 \$2,000,000 each fiscal year shall be used for grants
9 awarded under subsection (e).”.

10 (b) CLERICAL AMENDMENT.—The table of contents
11 in section 1(b) of the Weather Research and Forecasting
12 Innovation Act of 2017 (Public Law 115–25; 131 Stat.
13 91) is amended by striking the item relating to section
14 103 and inserting the following:

“Sec. 103. VORTEX-USA program.”.

15 **SEC. 8. GOVERNMENT ACCOUNTABILITY OFFICE REPORT**
16 **ON HAZARDOUS WEATHER AND WATER**
17 **ALERT DISSEMINATION.**

18 (a) IN GENERAL.—Not later than 540 days after the
19 date of the enactment of this Act, the Comptroller General
20 of the United States shall submit to the Committee on
21 Commerce, Science, and Transportation of the Senate and
22 the Committee on Science, Space, and Technology of the
23 House of Representatives a report that examines the infor-
24 mation technology infrastructure of the National Weather
25 Service of the National Oceanic and Atmospheric Adminis-

1 tration, specifically regarding the system for timely public
2 notification of hazardous weather and water event alerts
3 and updates.

4 (b) ELEMENTS.—The report required by subsection
5 (a) shall include the following:

6 (1) An analysis of the information technology
7 infrastructure of the National Weather Service, in-
8 cluding software and hardware capabilities and limi-
9 tations, including an examination of server and data
10 storage methods, broadband, data management, and
11 data sharing.

12 (2) An identification of secondary and tertiary
13 fail-safes for the timely distribution of hazardous
14 weather and water event alerts to the public.

15 (3) A determination of the extent to which pub-
16 lic notifications are delayed and an identification of
17 corrective measures that do not add additional noti-
18 fication time.

19 (4) An assessment of whether collaboration with
20 other Federal Government offices, States, or private
21 entities could reduce delays in notifications to the
22 public.

23 (5) A description of actions being undertaken to
24 better identify critical steps in the hazards notifica-
25 tion process that may be vulnerable to disruption or

1 failure in the event of communication, technologic,
2 or computational failure.

3 **SEC. 9. ELIMINATION OF CERTAIN REPORT REQUIRE-**
4 **MENTS.**

5 (a) WEATHER RESEARCH AND FORECASTING INNO-
6 VATION ACT OF 2017.—

7 (1) IN GENERAL.—Section 403 of the Weather
8 Research and Forecasting Innovation Act of 2017
9 (15 U.S.C. 8543) is amended by striking subsection
10 (d).

11 (2) TECHNICAL AMENDMENT.—Section 403(a)
12 of such Act (15 U.S.C. 8543(a)) is amended by in-
13 serting “the” after “Director of”.

14 (b) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
15 ISTRATION AUTHORIZATION ACT OF 1992.—Section 106
16 of the National Oceanic and Atmospheric Administration
17 Authorization Act of 1992 (Public Law 102–567; 106
18 Stat. 4274) is amended by striking subsection (c) (15
19 U.S.C. 1537).

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