

117TH CONGRESS 2D SESSION

S. 3817

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

IN THE SENATE OF THE UNITED STATES

MARCH 10 (legislative day, MARCH 7), 2022

Mr. Wicker (for himself, Mr. Grassley, Mrs. Hyde-Smith, Mr. Thune, and Ms. Ernst) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To improve the 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,
- 3 SECTION 1. SHORT TITLE.
- 4 This Act may be cited as the "Tornado Observations
- 5 Research and Notification Assessment for Development of
- 6 Operations Act" or the "TORNADO Act".
- 7 SEC. 2. DEFINITIONS.
- 8 In this Act:
- 9 (1) Historically black college or uni-
- 10 VERSITY.—The term "historically Black college or

1	university" has the meaning given the term "part B
2	institution" in section 322 of the Higher Education
3	Act of 1965 (20 U.S.C. 1061).
4	(2) Institution of Higher Education.—The
5	term "institution of higher education" has the
6	meaning given the term in section 101(a) of the
7	Higher Education Act of 1965 (20 U.S.C. 1001(a)).
8	(3) Under Secretary.—The term "Under
9	Secretary" means the Under Secretary of Commerce
10	for Oceans and Atmosphere.
11	SEC. 3. HAZARDOUS WEATHER AND WATER EVENT RISK
12	COMMUNICATION.
12	
13	(a) In General.—The Under Secretary shall main-
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13 14 15 16	(a) In General.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the
13 14 15 16 17	(a) IN GENERAL.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and en-
13 14 15 16 17 18	(a) In General.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and encouraging response to prevent loss of life and property.
13 14 15 16 17 18 19	(a) In General.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and encouraging response to prevent loss of life and property. (b) HAZARD RISK COMMUNICATION IMPROVEMENT
13 14 15 16 17 18 19 20	(a) In General.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and encouraging response to prevent loss of life and property. (b) HAZARD RISK COMMUNICATION IMPROVEMENT AND SIMPLIFICATION.—
13 14 15 16 17 18 19 20 21	(a) In General.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and encouraging response to prevent loss of life and property. (b) Hazard Risk Communication Improvement and Simplification.— (1) In General.—The Under Secretary shall

- of simplifying and improving the communication of hazardous weather and water event risks.
 - (2) TERMINOLOGY.—The Office shall identify, eliminate, or modify unnecessary, redundant, or confusing terms for hazardous weather and water event communications and add new terminology, as appropriate.
 - (3) COMMUNICATIONS IMPROVEMENT.—The Office shall improve the form, content, and methods of hazardous weather and water event communications to more clearly inform action and increase the likelihood that the public takes such action to prevent the loss of life or property.
 - (4) EVALUATIONS.—The Office shall, in coordination with the performance branch of the National Weather Service, develop metrics for that branch to track and evaluate the degree to which hazardous weather and water event communications result in action and response.
 - (5) SUPPORT PLAN.—The Office shall develop a plan for the purpose of supporting the activities described in paragraph (3). The plan shall be periodically updated and informed by internal and extramural research and the results of the evaluation of

1	hazardous weather and water event communications
2	conducted under paragraph (4).
3	(6) Methods.—In carrying out this subsection,
4	the Office shall develop and implement recommenda-
5	tions that—
6	(A) are based on the best and most recent
7	understanding from authoritative social, behav-
8	ioral, risk, and communication science research;
9	(B) are validated by social, behavioral,
10	risk, and communication science sound survey
11	designs, taking into account the importance of
12	reproducibility and replicability of results, using
13	rigorous statistical analyses;
14	(C) account for the needs of various demo-
15	graphics, vulnerable populations, and geo-
16	graphic regions;
17	(D) account for the differences between
18	various types of weather and water hazards;
19	(E) respond to the needs of Federal, State,
20	and local government partners and media part-
21	ners; and
22	(F) account for necessary changes in the
23	infrastructure, technology, and protocols for
24	creating and disseminating federally operated
25	watches and warnings.

1	(7) COORDINATION.—The Office shall periodi-
2	cally provide updates on best practices for commu-
3	nicating hazardous weather and water events to
4	Federal, State, and local government partners, insti-
5	tutions of higher education, private entities, and
6	media partners.
7	(8) Timeliness and consistency.—The Of-
8	fice shall develop best practices and guidance for en-
9	suring timely and consistent communication across
10	public facing platforms that disseminate hazardous
11	weather and water event information.
12	(c) Hazard Communication Research and En-
13	GAGEMENT.—
13 14	GAGEMENT.— (1) IN GENERAL.—The Under Secretary shall
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14 15	(1) In general.—The Under Secretary shall establish or maintain a research program—
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14 15 16 17	 (1) IN GENERAL.—The Under Secretary shall establish or maintain a research program— (A) to modernize the creation and communication of risk-based, statistically reliable, probabilistic hazard information to inform effective.
14 15 16 17 18	 (1) IN GENERAL.—The Under Secretary shall establish or maintain a research program— (A) to modernize the creation and communication of risk-based, statistically reliable, probabilistic hazard information to inform effective responses to hazardous weather and water
14 15 16 17 18 19 20	(1) In general.—The Under Secretary shall establish or maintain a research program— (A) to modernize the creation and communication of risk-based, statistically reliable, probabilistic hazard information to inform effective responses to hazardous weather and water events; and
14 15 16 17 18 19 20 21	(1) In General.—The Under Secretary shall establish or maintain a research program— (A) to modernize the creation and communication of risk-based, statistically reliable, probabilistic hazard information to inform effective responses to hazardous weather and water events; and (B) to improve the fundamental social, be-

1 (2) Coordination.—In carrying out the re-2 search program required by paragraph (1), the 3 Under Secretary shall coordinate and communicate 4 with States, Tribes, localities, and emergency man-5 agers on research priorities and results. 6 (3) Pilot program required.— 7 (A) IN GENERAL.—To further research 8 into hazard communication, the Under Sec-9 retary, in collaboration with one or more eligible 10 institutions, shall establish a pilot program to 11 test the effectiveness of implementing the re-12 search conducted under this subsection. 13 (B) Eligible institution defined.—In 14 this paragraph, the term "eligible institution" 15 means any of the following: 16 (i) A historically Black college or uni-17 versity located in an area of persistent pov-18 erty that is subjected to frequent severe 19 weather, such as tornadoes, hurricanes, 20 and floods. 21 (ii) An institution of higher education

in close proximity to a National Weather

Service Weather Forecast Office of the Na-

tional Weather Service.

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- 1 (d) Data Management.—The Under Secretary
- 2 shall establish, maintain, and improve a central repository
- 3 system for the National Oceanic and Atmospheric Admin-
- 4 istration for social, behavioral, risk, and economic data re-
- 5 lated to the communication of hazardous weather and
- 6 water events, including data developed or received pursu-
- 7 ant to paragraphs (3), (4), and (5) of subsection (b).
- 8 (e) DIGITAL WATERMARKING.—The Under Secretary
- 9 shall develop methods to reduce the likelihood of unauthor-
- 10 ized tampering with online hazardous weather and water
- 11 event risk communication, such as developing digital wa-
- 12 termarks.
- 13 SEC. 4. WARN-ON-FORECAST STRATEGIC PLAN.
- 14 (a) IN GENERAL.—Not later than one year after the
- 15 date of the enactment of this Act, the Under Secretary
- 16 shall prepare and submit to Congress a strategic plan for
- 17 developing and prioritizing the implementation of high-
- 18 resolution probabilistic forecast guidance for tornadic con-
- 19 ditions using a next-generation weather forecast and
- 20 warning framework.
- 21 (b) Plan Elements.—The strategic plan required
- 22 by subsection (a) shall include the following:
- 23 (1) A discussion of—

1	(A) the priorities and needs of vulnerable
2	populations and National Weather Service part-
3	ners; and
4	(B) high-performance computing, visualiza-
5	tion, and dissemination needs.
6	(2) A timeline and guidance for implementation
7	of—
8	(A) high-resolution numerical weather pre-
9	diction models;
10	(B) methods for meeting the high-perform-
11	ance computing, visualization, and dissemina-
12	tion needs discussed under paragraph (1)(B);
13	(C) real-time high-resolution probabilistic
14	forecasts;
15	(D) improved observations, including
16	through radars, satellites, and uncrewed aerial
17	systems;
18	(E) a flexible framework to communicate
19	clear and simple hazardous weather and water
20	event information to the public; and
21	(F) social, behavioral, risk, and commu-
22	nication research to improve the forecaster
23	operational environment and societal informa-
24	tion reception and response.

SEC. 5. TORNADO RATING SYSTEM.

- 2 (a) IN GENERAL.—The Under Secretary shall, in col-
- 3 laboration with such stakeholders as the Under Secretary
- 4 considers appropriate—
- 5 (1) evaluate the system used as of the date of
- 6 the enactment of this Act to rate the severity of tor-
- 7 nadoes; and
- 8 (2) determine whether updates to that system
- 9 are required to ensure that the ratings accurately re-
- 10 flect the severity of tornadoes.
- 11 (b) UPDATE REQUIRED.—If the Under Secretary de-
- 12 termines under subsection (a) that updates to the tornado
- 13 rating system are necessary, the Under Secretary shall up-
- 14 date the system.

15 SEC. 6. POST-STORM SURVEYS AND ASSESSMENTS.

- 16 (a) In General.—The Under Secretary shall per-
- 17 form one or more post-storm surveys and assessments fol-
- 18 lowing each hazardous weather or water event determined
- 19 by the Under Secretary to be of sufficient societal impor-
- 20 tance to warrant a post-event survey and assessment.
- 21 (b) Coordination.—The Under Secretary shall co-
- 22 ordinate with Federal, State, and local governments, pri-
- 23 vate entities, and relevant institutions of higher education
- 24 when conducting post-storm surveys and assessments
- 25 under subsection (a) in order to optimize data collection,
- 26 sharing, and integration.

- 1 (c) Data Availability.—The Under Secretary shall make the data obtained from each post-storm survey and 2 3 assessment conducted under subsection (a) available to the 4 public as soon as practicable after conducting the survey 5 and assessment. 6 (d) Improvement.—The Under Secretary shall— 7 (1) investigate the role of uncrewed aerial sys-8 tems in data collection during post-storm surveys 9 and assessments conducted under subsection (a); 10 (2) update tactics and procedures to enhance 11 the efficiency and reliability of data obtained from 12 post-storm surveys and assessments; and 13 (3) increase the number of post-storm commu-14 nity impact studies, including surveying individual 15 responses and gathering survivability statistics. 16 (e) Support for Employees.—The Under Secretary shall provide training, resources, and access to professional counseling to support the emotional and mental 18 health and well-being of employees conducting post-storm 19 20 surveys and assessments under subsection (a). SEC. 7. VORTEX-USA PROGRAM.
- 21
- 22 (a) In General.—Section 103 of the Weather Re-
- 23 search and Forecasting Innovation Act of 2017 (15 U.S.C.
- 8513) is amended—

1	(1) in the section heading, by striking "TOR-
2	NADO WARNING IMPROVEMENT AND EXTEN-
3	SION" and inserting "VORTEX-USA";
4	(2) in subsection (a), by striking "establish a
5	tornado warning improvement and extension pro-
6	gram" and inserting "maintain a program for rap-
7	idly improving tornado forecast and warnings";
8	(3) by striking subsections (c) and (d); and
9	(4) by adding at the end the following:
10	"(c) Innovative Observations.—The Under Sec-
11	retary shall ensure that the program required by sub-
12	section (a) periodically examines the value of incorporating
13	innovative observations with respect to the improvement
14	of tornado forecasts, predictions, and warnings, such as
15	acoustic or infrasonic measurements, observations from
16	phased array radars, and observations from mesonets.
17	"(d) Warnings.—The program required by sub-
18	section (a) shall—
19	"(1) continue the research necessary to develop
20	and deploy probabilistic weather forecast guidance
21	technology for tornados; and
22	"(2) incorporate, as appropriate, hazard com-
23	munication research.
24	"(e) Research.—

"(1) IN GENERAL.—The Under Secretary shall, 1 2 through the program required by subsection (a), award grants for research that focuses on improv-3 4 ing-"(A) the social, behavioral, risk, commu-5 6 nication, and economic sciences related to 7 vulnerabilities, risk communication, and delivery 8 of information critical for saving lives and prop-9 erty related to tornadoes; and 10 "(B) the physical sciences, engineering, 11 and technology related to tornado formation, 12 the interactions of tornadoes with the built and 13 natural environment, and the interaction of tor-14 nadoes and hurricanes. "(2) Priority institutions.—In awarding 15 16 grants under paragraph (1), the Under Secretary 17 shall prioritize awarding grants to historically Black 18 colleges and universities. 19 "(f) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Under Secretary 21 to carry out this section \$7,500,000 for each of fiscal years 2022 through 2030, of which not less than 23 \$2,000,000 each fiscal year shall be used for grants awarded under subsection (e).".

- 1 (b) CLERICAL AMENDMENT.—The table of contents
- 2 in section 1(b) of the Weather Research and Forecasting
- 3 Innovation Act of 2017 (Public Law 115–25; 131 Stat.
- 4 91) is amended by striking the item relating to section
- 5 103 and inserting the following:

"Sec. 103. VORTEX-USA program.".

6 SEC. 8. REPORTS.

- 7 (a) Weather Research and Forecasting Inno-
- 8 VATION ACT OF 2017.—
- 9 (1) IN GENERAL.—Section 403 of the Weather
- Research and Forecasting Innovation Act of 2017
- 11 (15 U.S.C. 8543) is amended by striking subsection
- 12 (d).
- 13 (2) Technical amendment.—Section 403(a)
- of such Act (15 U.S.C. 8543(a)) is amended by in-
- serting "the" after "Director of".
- 16 (b) National Oceanic and Atmospheric Admin-
- 17 ISTRATION AUTHORIZATION ACT OF 1992.—Section 106
- 18 of the National Oceanic and Atmospheric Administration
- 19 Authorization Act of 1992 (Public Law 102-567; 106
- 20 Stat. 4274) is amended by striking subsection (c) (15
- 21 U.S.C. 1537).

1	SEC. 9. GOVERNMENT ACCOUNTABILITY OFFICE REPORT
2	ON HAZARDOUS WEATHER AND WATER
3	ALERT DISSEMINATION.
4	(a) In General.—Not later than 540 days after the
5	date of the enactment of this Act, the Comptroller General
6	of the United States shall submit to the Committee or
7	Commerce, Science, and Transportation of the Senate and
8	the Committee on Science, Space, and Technology of the
9	House of Representatives a report that examines the infor-
10	mation technology infrastructure of the National Weather
11	Service of the National Oceanic and Atmospheric Adminis-
12	tration, specifically regarding the system for timely public
13	notification of hazardous weather and water alerts and up-
14	dates.
15	(b) Elements.—The report required by subsection
16	(a) shall include the following:
17	(1) An analysis of the information technology
18	infrastructure of the National Weather Service, in-
19	cluding software and hardware capabilities and limi-
20	tations, including an examination of server and data
21	storage methods, broadband, data management, and
22	data sharing.
23	(2) An identification of secondary and tertiary
24	fail-safes for the timely distribution of hazardous
25	weather event alerts to the public.

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- (3) A determination of the extent to which public notifications are delayed and an identification of corrective measures that do not add additional notification time.
 - (4) An assessment of whether collaboration with other Federal offices, States, or private entities could reduce delays in notifications to the public.
 - (5) A description of actions being undertaken to better identify critical steps in the hazards notification process that may be vulnerable to disruption or failure in the event of communication, technologic, or computational failure.

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