

In the Senate of the United States,

March 29, 2017.

Resolved, That the bill from the House of Representatives (H.R. 353) entitled “An Act to improve the National Oceanic and Atmospheric Administration’s weather research through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events, to expand commercial opportunities for the provision of weather data, and for other purposes.”, do pass with the following

AMENDMENT:

Strike out all after the enacting clause and insert the following:

1 ***SECTION 1. SHORT TITLE; TABLE OF CONTENTS.***

2 (a) *SHORT TITLE*.—*This Act may be cited as the*
3 *“Weather Research and Forecasting Innovation Act of*
4 *2017”*.

5 (b) *TABLE OF CONTENTS*.—*The table of contents for*
6 *this Act is as follows:*

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—UNITED STATES WEATHER RESEARCH AND FORECASTING IMPROVEMENT

Sec. 101. Public safety priority.

Sec. 102. Weather research and forecasting innovation.

Sec. 103. Tornado warning improvement and extension program.

Sec. 104. Hurricane forecast improvement program.

Sec. 105. Weather research and development planning.

Sec. 106. Observing system planning.

Sec. 107. Observing system simulation experiments.

Sec. 108. Annual report on computing resources prioritization.

Sec. 109. United States Weather Research program.

Sec. 110. Authorization of appropriations.

TITLE II—SUBSEASONAL AND SEASONAL FORECASTING INNOVATION

Sec. 201. Improving subseasonal and seasonal forecasts.

TITLE III—WEATHER SATELLITE AND DATA INNOVATION

Sec. 301. National Oceanic and Atmospheric Administration satellite and data management.

Sec. 302. Commercial weather data.

Sec. 303. Unnecessary duplication.

TITLE IV—FEDERAL WEATHER COORDINATION

Sec. 401. Environmental Information Services Working Group.

Sec. 402. Interagency weather research and forecast innovation coordination.

Sec. 403. Office of Oceanic and Atmospheric Research and National Weather Service exchange program.

Sec. 404. Visiting fellows at National Weather Service.

Sec. 405. Warning coordination meteorologists at weather forecast offices of National Weather Service.

Sec. 406. Improving National Oceanic and Atmospheric Administration communication of hazardous weather and water events.

Sec. 407. National Oceanic and Atmospheric Administration Weather Ready All Hazards Award Program.

Sec. 408. Department of Defense weather forecasting activities.

Sec. 409. National Weather Service; operations and workforce analysis.

Sec. 410. Report on contract positions at National Weather Service.

Sec. 411. Weather impacts to communities and infrastructure.

Sec. 412. Weather enterprise outreach.

Sec. 413. Hurricane hunter aircraft.

Sec. 414. Study on gaps in NEXRAD coverage and recommendations to address such gaps.

TITLE V—TSUNAMI WARNING, EDUCATION, AND RESEARCH ACT OF 2017

Sec. 501. Short title.

Sec. 502. References to the Tsunami Warning and Education Act.

Sec. 503. Expansion of purposes of Tsunami Warning and Education Act.

Sec. 504. *Modification of tsunami forecasting and warning program.*
 Sec. 505. *Modification of national tsunami hazard mitigation program.*
 Sec. 506. *Modification of tsunami research program.*
 Sec. 507. *Global tsunami warning and mitigation network.*
 Sec. 508. *Tsunami science and technology advisory panel.*
 Sec. 509. *Reports.*
 Sec. 510. *Authorization of appropriations.*
 Sec. 511. *Outreach responsibilities.*
 Sec. 512. *Repeal of duplicate provisions of law.*

1 **SEC. 2. DEFINITIONS.**

2 *In this Act:*

3 (1) *SEASONAL.*—*The term “seasonal” means the*
 4 *time range between 3 months and 2 years.*

5 (2) *STATE.*—*The term “State” means a State, a*
 6 *territory, or possession of the United States, including*
 7 *a Commonwealth, or the District of Columbia.*

8 (3) *SUBSEASONAL.*—*The term “subseasonal”*
 9 *means the time range between 2 weeks and 3 months.*

10 (4) *UNDER SECRETARY.*—*The term “Under Sec-*
 11 *retary” means the Under Secretary of Commerce for*
 12 *Oceans and Atmosphere.*

13 (5) *WEATHER INDUSTRY AND WEATHER ENTER-*
 14 *PRISE.*—*The terms “weather industry” and “weather*
 15 *enterprise” are interchangeable in this Act, and in-*
 16 *clude individuals and organizations from public, pri-*
 17 *ivate, and academic sectors that contribute to the re-*
 18 *search, development, and production of weather fore-*
 19 *cast products, and primary consumers of these weath-*
 20 *er forecast products.*

1 **TITLE I—UNITED STATES**
 2 **WEATHER RESEARCH AND**
 3 **FORECASTING IMPROVEMENT**

4 **SEC. 101. PUBLIC SAFETY PRIORITY.**

5 *In conducting research, the Under Secretary shall*
 6 *prioritize improving weather data, modeling, computing,*
 7 *forecasting, and warnings for the protection of life and*
 8 *property and for the enhancement of the national economy.*

9 **SEC. 102. WEATHER RESEARCH AND FORECASTING INNOVA-**
 10 **TION.**

11 *(a) PROGRAM.—The Assistant Administrator for the*
 12 *Office of Oceanic and Atmospheric Research shall conduct*
 13 *a program to develop improved understanding of and fore-*
 14 *cast capabilities for atmospheric events and their impacts,*
 15 *placing priority on developing more accurate, timely, and*
 16 *effective warnings and forecasts of high impact weather*
 17 *events that endanger life and property.*

18 *(b) PROGRAM ELEMENTS.—The program described in*
 19 *subsection (a) shall focus on the following activities:*

20 *(1) Improving the fundamental understanding of*
 21 *weather consistent with section 101, including the*
 22 *boundary layer and other processes affecting high im-*
 23 *pact weather events.*

24 *(2) Improving the understanding of how the pub-*
 25 *lic receives, interprets, and responds to warnings and*

1 *forecasts of high impact weather events that endanger*
 2 *life and property.*

3 *(3) Research and development, and transfer of*
 4 *knowledge, technologies, and applications to the Na-*
 5 *tional Weather Service and other appropriate agen-*
 6 *cies and entities, including the United States weather*
 7 *industry and academic partners, related to—*

8 *(A) advanced radar, radar networking tech-*
 9 *nologies, and other ground-based technologies, in-*
 10 *cluding those emphasizing rapid, fine-scale sens-*
 11 *ing of the boundary layer and lower troposphere,*
 12 *and the use of innovative, dual-polarization,*
 13 *phased-array technologies;*

14 *(B) aerial weather observing systems;*

15 *(C) high performance computing and infor-*
 16 *mation technology and wireless communication*
 17 *networks;*

18 *(D) advanced numerical weather prediction*
 19 *systems and forecasting tools and techniques that*
 20 *improve the forecasting of timing, track, inten-*
 21 *sity, and severity of high impact weather, in-*
 22 *cluding through—*

23 *(i) the development of more effective*
 24 *mesoscale models;*

1 (ii) more effective use of existing, and
2 the development of new, regional and na-
3 tional cloud-resolving models;

4 (iii) enhanced global weather models;
5 and

6 (iv) integrated assessment models;

7 (E) quantitative assessment tools for meas-
8 uring the impact and value of data and observ-
9 ing systems, including Observing System Sim-
10 ulation Experiments (as described in section
11 107), Observing System Experiments, and Anal-
12 yses of Alternatives;

13 (F) atmospheric chemistry and interactions
14 essential to accurately characterizing atmos-
15 pheric composition and predicting meteorological
16 processes, including cloud microphysical, pre-
17 cipitation, and atmospheric electrification proc-
18 esses, to more effectively understand their role in
19 severe weather; and

20 (G) additional sources of weather data and
21 information, including commercial observing
22 systems.

23 (4) A technology transfer initiative, carried out
24 jointly and in coordination with the Director of the
25 National Weather Service, and in cooperation with

1 *the United States weather industry and academic*
2 *partners, to ensure continuous development and tran-*
3 *sition of the latest scientific and technological ad-*
4 *vances into operations of the National Weather Serv-*
5 *ice and to establish a process to sunset outdated and*
6 *expensive operational methods and tools to enable*
7 *cost-effective transfer of new methods and tools into*
8 *operations.*

9 (c) *EXTRAMURAL RESEARCH.*—

10 (1) *IN GENERAL.*—*In carrying out the program*
11 *under this section, the Assistant Administrator for*
12 *Oceanic and Atmospheric Research shall collaborate*
13 *with and support the non-Federal weather research*
14 *community, which includes institutions of higher edu-*
15 *cation, private entities, and nongovernmental organi-*
16 *zations, by making funds available through competi-*
17 *tive grants, contracts, and cooperative agreements.*

18 (2) *SENSE OF CONGRESS.*—*It is the sense of*
19 *Congress that not less than 30 percent of the funds for*
20 *weather research and development at the Office of*
21 *Oceanic and Atmospheric Research should be made*
22 *available for the purpose described in paragraph (1).*

23 (d) *ANNUAL REPORT.*—*Each year, concurrent with the*
24 *annual budget request submitted by the President to Con-*
25 *gress under section 1105 of title 31, United States Code,*

1 *for the National Oceanic and Atmospheric Administration,*
 2 *the Under Secretary shall submit to Congress a description*
 3 *of current and planned activities under this section.*

4 **SEC. 103. TORNADO WARNING IMPROVEMENT AND EXTEN-**
 5 **SION PROGRAM.**

6 (a) *IN GENERAL.*—*The Under Secretary, in collabora-*
 7 *tion with the United States weather industry and academic*
 8 *partners, shall establish a tornado warning improvement*
 9 *and extension program.*

10 (b) *GOAL.*—*The goal of such program shall be to reduce*
 11 *the loss of life and economic losses from tornadoes through*
 12 *the development and extension of accurate, effective, and*
 13 *timely tornado forecasts, predictions, and warnings, includ-*
 14 *ing the prediction of tornadoes beyond 1 hour in advance.*

15 (c) *PROGRAM PLAN.*—*Not later than 180 days after*
 16 *the date of the enactment of this Act, the Assistant Adminis-*
 17 *trator for Oceanic and Atmospheric Research, in coordina-*
 18 *tion with the Director of the National Weather Service, shall*
 19 *develop a program plan that details the specific research,*
 20 *development, and technology transfer activities, as well as*
 21 *corresponding resources and timelines, necessary to achieve*
 22 *the program goal.*

23 (d) *ANNUAL BUDGET FOR PLAN SUBMITTAL.*—*Fol-*
 24 *lowing completion of the plan, the Under Secretary, acting*
 25 *through the Assistant Administrator for Oceanic and At-*

1 *mospheric Research and in coordination with the Director*
 2 *of the National Weather Service, shall, not less frequently*
 3 *than once each year, submit to Congress a proposed budget*
 4 *corresponding with the activities identified in the plan.*

5 **SEC. 104. HURRICANE FORECAST IMPROVEMENT PROGRAM.**

6 (a) *IN GENERAL.*—*The Under Secretary, in collabora-*
 7 *tion with the United States weather industry and such aca-*
 8 *demic entities as the Administrator considers appropriate,*
 9 *shall maintain a project to improve hurricane forecasting.*

10 (b) *GOAL.*—*The goal of the project maintained under*
 11 *subsection (a) shall be to develop and extend accurate hurri-*
 12 *cane forecasts and warnings in order to reduce loss of life,*
 13 *injury, and damage to the economy, with a focus on—*

14 (1) *improving the prediction of rapid inten-*
 15 *sification and track of hurricanes;*

16 (2) *improving the forecast and communication of*
 17 *storm surges from hurricanes; and*

18 (3) *incorporating risk communication research*
 19 *to create more effective watch and warning products.*

20 (c) *PROJECT PLAN.*—*Not later than 1 year after the*
 21 *date of the enactment of this Act, the Under Secretary, act-*
 22 *ing through the Assistant Administrator for Oceanic and*
 23 *Atmospheric Research and in consultation with the Director*
 24 *of the National Weather Service, shall develop a plan for*
 25 *the project maintained under subsection (a) that details the*

1 *specific research, development, and technology transfer ac-*
 2 *tivities, as well as corresponding resources and timelines,*
 3 *necessary to achieve the goal set forth in subsection (b).*

4 **SEC. 105. WEATHER RESEARCH AND DEVELOPMENT PLAN-**
 5 **NING.**

6 *Not later than 1 year after the date of the enactment*
 7 *of this Act, and not less frequently than once each year*
 8 *thereafter, the Under Secretary, acting through the Assist-*
 9 *ant Administrator for Oceanic and Atmospheric Research*
 10 *and in coordination with the Director of the National*
 11 *Weather Service and the Assistant Administrator for Sat-*
 12 *ellite and Information Services, shall issue a research and*
 13 *development and research to operations plan to restore and*
 14 *maintain United States leadership in numerical weather*
 15 *prediction and forecasting that—*

16 *(1) describes the forecasting skill and technology*
 17 *goals, objectives, and progress of the National Oceanic*
 18 *and Atmospheric Administration in carrying out the*
 19 *program conducted under section 102;*

20 *(2) identifies and prioritizes specific research*
 21 *and development activities, and performance metrics,*
 22 *weighted to meet the operational weather mission of*
 23 *the National Weather Service to achieve a weather-*
 24 *ready Nation;*

(3) describes how the program will collaborate with stakeholders, including the United States weather industry and academic partners; and

(4) identifies, through consultation with the National Science Foundation, the United States weather industry, and academic partners, research necessary to enhance the integration of social science knowledge into weather forecast and warning processes, including to improve the communication of threat information necessary to enable improved severe weather planning and decisionmaking on the part of individuals and communities.

SEC. 106. OBSERVING SYSTEM PLANNING.

The Under Secretary shall—

(1) develop and maintain a prioritized list of observation data requirements necessary to ensure weather forecasting capabilities to protect life and property to the maximum extent practicable;

(2) consistent with section 107, utilize Observing System Simulation Experiments, Observing System Experiments, Analyses of Alternatives, and other appropriate assessment tools to ensure continuous systemic evaluations of the observing systems, data, and information needed to meet the requirements of para-

1 *graph (1), including options to maximize observa-*
 2 *tional capabilities and their cost-effectiveness;*

3 *(3) identify current and potential future data*
 4 *gaps in observing capabilities related to the require-*
 5 *ments listed under paragraph (1); and*

6 *(4) determine a range of options to address gaps*
 7 *identified under paragraph (3).*

8 **SEC. 107. OBSERVING SYSTEM SIMULATION EXPERIMENTS.**

9 *(a) IN GENERAL.—In support of the requirements of*
 10 *section 106, the Assistant Administrator for Oceanic and*
 11 *Atmospheric Research shall undertake Observing System*
 12 *Simulation Experiments, or such other quantitative assess-*
 13 *ments as the Assistant Administrator considers appro-*
 14 *priate, to quantitatively assess the relative value and bene-*
 15 *fits of observing capabilities and systems. Technical and*
 16 *scientific Observing System Simulation Experiment eval-*
 17 *uations—*

18 *(1) may include assessments of the impact of ob-*
 19 *serving capabilities on—*

20 *(A) global weather prediction;*

21 *(B) hurricane track and intensity fore-*
 22 *casting;*

23 *(C) tornado warning lead times and accu-*
 24 *racy;*

1 (D) prediction of mid-latitude severe local
2 storm outbreaks; and

3 (E) prediction of storms that have the po-
4 tential to cause extreme precipitation and flood-
5 ing lasting from 6 hours to 1 week; and

6 (2) shall be conducted in cooperation with other
7 appropriate entities within the National Oceanic and
8 Atmospheric Administration, other Federal agencies,
9 the United States weather industry, and academic
10 partners to ensure the technical and scientific merit
11 of results from Observing System Simulation Experi-
12 ments or other appropriate quantitative assessment
13 methodologies.

14 (b) *REQUIREMENTS.*—Observing System Simulation
15 Experiments shall quantitatively—

16 (1) determine the potential impact of proposed
17 space-based, suborbital, and in situ observing systems
18 on analyses and forecasts, including potential im-
19 pacts on extreme weather events across all parts of the
20 Nation;

21 (2) evaluate and compare observing system de-
22 sign options; and

23 (3) assess the relative capabilities and costs of
24 various observing systems and combinations of observ-

1 *ing systems in providing data necessary to protect life*
 2 *and property.*

3 (c) *IMPLEMENTATION.—Observing System Simulation*
 4 *Experiments—*

5 (1) *shall be conducted prior to the acquisition of*
 6 *major Government-owned or Government-leased oper-*
 7 *ational observing systems, including polar-orbiting*
 8 *and geostationary satellite systems, with a lifecycle*
 9 *cost of more than \$500,000,000; and*

10 (2) *shall be conducted prior to the purchase of*
 11 *any major new commercially provided data with a*
 12 *lifecycle cost of more than \$500,000,000.*

13 (d) *PRIORITY OBSERVING SYSTEM SIMULATION EX-*
 14 *PERIMENTS.—*

15 (1) *GLOBAL NAVIGATION SATELLITE SYSTEM*
 16 *RADIO OCCULTATION.—Not later than 30 days after*
 17 *the date of the enactment of this Act, the Assistant*
 18 *Administrator for Oceanic and Atmospheric Research*
 19 *shall complete an Observing System Simulation Ex-*
 20 *periment to assess the value of data from Global*
 21 *Navigation Satellite System Radio Occultation.*

22 (2) *GEOSTATIONARY HYPERSPECTRAL SOUNDER*
 23 *GLOBAL CONSTELLATION.—Not later than 120 days*
 24 *after the date of the enactment of this Act, the Assist-*
 25 *ant Administrator for Oceanic and Atmospheric Re-*

1 *search shall complete an Observing System Simula-*
 2 *tion Experiment to assess the value of data from a*
 3 *geostationary hyperspectral sounder global constella-*
 4 *tion.*

5 *(e) RESULTS.—Upon completion of all Observing Sys-*
 6 *tem Simulation Experiments, the Assistant Administrator*
 7 *shall make available to the public the results an assessment*
 8 *of related private and public sector weather data sourcing*
 9 *options, including their availability, affordability, and*
 10 *cost-effectiveness. Such assessments shall be developed in ac-*
 11 *cordance with section 50503 of title 51, United States Code.*

12 **SEC. 108. ANNUAL REPORT ON COMPUTING RESOURCES**
 13 **PRIORITIZATION.**

14 *Not later than 1 year after the date of the enactment*
 15 *of this Act and not less frequently than once each year there-*
 16 *after, the Under Secretary, acting through the Chief Infor-*
 17 *mation Officer of the National Oceanic and Atmospheric*
 18 *Administration and in coordination with the Assistant Ad-*
 19 *ministrator for Oceanic and Atmospheric Research and the*
 20 *Director of the National Weather Service, shall produce and*
 21 *make publicly available a report that explains how the*
 22 *Under Secretary intends—*

23 *(1) to continually support upgrades to pursue*
 24 *the fastest, most powerful, and cost-effective high per-*

1 *formance computing technologies in support of its*
 2 *weather prediction mission;*

3 *(2) to ensure a balance between the research to*
 4 *operations requirements to develop the next genera-*
 5 *tion of regional and global models as well as highly*
 6 *reliable operational models;*

7 *(3) to take advantage of advanced development*
 8 *concepts to, as appropriate, make next generation*
 9 *weather prediction models available in beta-test mode*
 10 *to operational forecasters, the United States weather*
 11 *industry, and partners in academic and Government*
 12 *research; and*

13 *(4) to use existing computing resources to im-*
 14 *prove advanced research and operational weather pre-*
 15 *diction.*

16 **SEC. 109. UNITED STATES WEATHER RESEARCH PROGRAM.**

17 *Section 108 of the Oceanic and Atmospheric Adminis-*
 18 *tration Authorization Act of 1992 (Public Law 102–567;*
 19 *15 U.S.C. 313 note) is amended—*

20 *(1) in subsection (a)—*

21 *(A) in paragraph (3), by striking “; and”*
 22 *and inserting a semicolon;*

23 *(B) in paragraph (4), by striking the period*
 24 *at the end and inserting a semicolon; and*

1 (C) by inserting after paragraph (4) the fol-
2 lowing:

3 “(5) submit to the Committee on Commerce,
4 Science, and Transportation of the Senate and the
5 Committee on Science, Space, and Technology of the
6 House of Representatives, not less frequently than
7 once each year, a report, including—

8 “(A) a list of ongoing research projects;

9 “(B) project goals and a point of contact for
10 each project;

11 “(C) the five projects related to weather ob-
12 servations, short-term weather, or subseasonal
13 forecasts within Office of Oceanic and Atmos-
14 pheric Research that are closest to
15 operationalization;

16 “(D) for each project referred to in subpara-
17 graph (C)—

18 “(i) the potential benefit;

19 “(ii) any barrier to operationalization;

20 and

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

1 “(6) establish teams with staff from the Office of
2 *Oceanic and Atmospheric Research and the National*
3 *Weather Service to oversee the operationalization of*
4 *research products developed by the Office of Oceanic*
5 *and Atmospheric Research;*

6 “(7) develop mechanisms for research priorities
7 *of the Office of Oceanic and Atmospheric Research to*
8 *be informed by the relevant line offices within the Na-*
9 *tional Oceanic and Atmospheric Administration, the*
10 *relevant user community, and the weather enterprise;*

11 “(8) develop an internal mechanism to track the
12 *progress of each research project within the Office of*
13 *Oceanic and Atmospheric Research and mechanisms*
14 *to terminate a project that is not adequately pro-*
15 *gressing;*

16 “(9) develop and implement a system to track
17 *whether extramural research grant goals were accom-*
18 *plished;*

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

23 “(11) encourage academic collaboration with the
24 *Office of Oceanic and Atmospheric Research and the*

1 *National Weather Service by facilitating visiting*
 2 *scholars.”;*

3 *(2) in subsection (b), in the matter preceding*
 4 *paragraph (1), by striking “Not later than 90 days*
 5 *after the date of enactment of this Act, the” and in-*
 6 *serting “The”; and*

7 *(3) by adding at the end the following new sub-*
 8 *section:*

9 *“(c) SUBSEASONAL DEFINED.—In this section, the*
 10 *term ‘subseasonal’ means the time range between 2 weeks*
 11 *and 3 months.”.*

12 **SEC. 110. AUTHORIZATION OF APPROPRIATIONS.**

13 *(a) FISCAL YEARS 2017 AND 2018.—For each of fiscal*
 14 *years 2017 and 2018, there are authorized to be appro-*
 15 *priated to Office of Oceanic and Atmospheric Research—*

16 *(1) \$111,516,000 to carry out this title, of*
 17 *which—*

18 *(A) \$85,758,000 is authorized for weather*
 19 *laboratories and cooperative institutes; and*

20 *(B) \$25,758,000 is authorized for weather*
 21 *and air chemistry research programs; and*

22 *(2) an additional amount of \$20,000,000 for the*
 23 *joint technology transfer initiative described in sec-*
 24 *tion 102(b)(4).*

1 (b) *LIMITATION.*—No additional funds are authorized
 2 to carry out this title and the amendments made by this
 3 title.

4 **TITLE II—SUBSEASONAL AND**
 5 **SEASONAL FORECASTING IN-**
 6 **NOVATION**

7 **SEC. 201. IMPROVING SUBSEASONAL AND SEASONAL FORE-**
 8 **CASTS.**

9 Section 1762 of the Food Security Act of 1985 (Public
 10 Law 99–198; 15 U.S.C. 313 note) is amended—

11 (1) in subsection (a), by striking “(a)” and in-
 12 serting “(a) *FINDINGS.*—”;

13 (2) in subsection (b), by striking “(b)” and in-
 14 serting “(b) *POLICY.*—”; and

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

16 “(c) *FUNCTIONS.*—The Under Secretary, acting
 17 through the Director of the National Weather Service and
 18 the heads of such other programs of the National Oceanic
 19 and Atmospheric Administration as the Under Secretary
 20 considers appropriate, shall—

21 “(1) collect and utilize information in order to
 22 make usable, reliable, and timely foundational fore-
 23 casts of subseasonal and seasonal temperature and
 24 precipitation;

1 “(2) leverage existing research and models from
2 the weather enterprise to improve the forecasts under
3 paragraph (1);

4 “(3) determine and provide information on how
5 the forecasted conditions under paragraph (1) may
6 impact—

7 “(A) the number and severity of droughts,
8 fires, tornadoes, hurricanes, floods, heat waves,
9 coastal inundation, winter storms, high impact
10 weather, or other relevant natural disasters;

11 “(B) snowpack; and

12 “(C) sea ice conditions; and

13 “(4) develop an Internet clearinghouse to provide
14 the forecasts under paragraph (1) and the informa-
15 tion under paragraphs (1) and (3) on both national
16 and regional levels.

17 “(d) COMMUNICATION.—The Director of the National
18 Weather Service shall provide the forecasts under paragraph
19 (1) of subsection (c) and the information on their impacts
20 under paragraph (3) of such subsection to the public, in-
21 cluding public and private entities engaged in planning
22 and preparedness, such as National Weather Service Core
23 partners at the Federal, regional, State, tribal, and local
24 levels of government.

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

4 “(1) *by designating research and monitoring ac-*
 5 *tivities related to subseasonal and seasonal forecasts*
 6 *as a priority in one or more solicitations of the Coop-*
 7 *erative Institutes of the Office of Oceanic and Atmos-*
 8 *pheric Research;*

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

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

15 “(f) *FORECAST COMMUNICATION COORDINATORS.*—

16 “(1) *IN GENERAL.*—*The Under Secretary shall*
 17 *foster effective communication, understanding, and*
 18 *use of the forecasts by the intended users of the infor-*
 19 *mation described in subsection (d). This may include*
 20 *assistance to States for forecast communication coor-*
 21 *dinators to enable local interpretation and planning*
 22 *based on the information.*

23 “(2) *REQUIREMENTS.*—*For each State that re-*
 24 *quests assistance under this subsection, the Under*
 25 *Secretary may—*

1 “(A) provide funds to support an indi-
2 vidual in that State—

3 “(i) to serve as a liaison among the
4 National Oceanic and Atmospheric Admin-
5 istration, other Federal departments and
6 agencies, the weather enterprise, the State,
7 and relevant interests within that State;
8 and

9 “(ii) to receive the forecasts and infor-
10 mation under subsection (c) and dissemi-
11 nate the forecasts and information through-
12 out the State, including to county and trib-
13 al governments; and

14 “(B) require matching funds of at least 50
15 percent, from the State, a university, a non-
16 governmental organization, a trade association,
17 or the private sector.

18 “(3) *LIMITATION.*—Assistance to an individual
19 State under this subsection shall not exceed \$100,000
20 in a fiscal year.

21 “(g) *COOPERATION FROM OTHER FEDERAL AGEN-*
22 *CIES.*—Each Federal department and agency shall cooper-
23 ate as appropriate with the Under Secretary in carrying
24 out this section.

25 “(h) *REPORTS.*—

1 “(1) *IN GENERAL.*—Not later than 18 months
 2 after the date of the enactment of the Weather Re-
 3 search and Forecasting Innovation Act of 2017, the
 4 Under Secretary shall submit to the Committee on
 5 Commerce, Science, and Transportation of the Senate
 6 and the Committee on Science, Space, and Technology
 7 of the House of Representatives a report, including—

8 “(A) *an analysis of the how information*
 9 *from the National Oceanic and Atmospheric Ad-*
 10 *ministration on subseasonal and seasonal fore-*
 11 *casts, as provided under subsection (c), is uti-*
 12 *lized in public planning and preparedness;*

13 “(B) *specific plans and goals for the contin-*
 14 *ued development of the subseasonal and seasonal*
 15 *forecasts and related products described in sub-*
 16 *section (c); and*

17 “(C) *an identification of research, moni-*
 18 *toring, observing, and forecasting requirements*
 19 *to meet the goals described in subparagraph (B).*

20 “(2) *CONSULTATION.*—In developing the report
 21 under paragraph (1), the Under Secretary shall con-
 22 sult with relevant Federal, regional, State, tribal, and
 23 local government agencies, research institutions, and
 24 the private sector.

25 “(i) *DEFINITIONS.*—In this section:

1 “(1) *FOUNDATIONAL FORECAST.*—*The term*
 2 *‘foundational forecast’ means basic weather observa-*
 3 *tion and forecast data, largely in raw form, before*
 4 *further processing is applied.*

5 “(2) *NATIONAL WEATHER SERVICE CORE PART-*
 6 *NERS.*—*The term ‘National Weather Service core*
 7 *partners’ means government and nongovernment enti-*
 8 *ties which are directly involved in the preparation or*
 9 *dissemination of, or discussions involving, hazardous*
 10 *weather or other emergency information put out by*
 11 *the National Weather Service.*

12 “(3) *SEASONAL.*—*The term ‘seasonal’ means the*
 13 *time range between 3 months and 2 years.*

14 “(4) *STATE.*—*The term ‘State’ means a State, a*
 15 *territory, or possession of the United States, including*
 16 *a Commonwealth, or the District of Columbia.*

17 “(5) *SUBSEASONAL.*—*The term ‘subseasonal’*
 18 *means the time range between 2 weeks and 3 months.*

19 “(6) *UNDER SECRETARY.*—*The term ‘Under Sec-*
 20 *retary’ means the Under Secretary of Commerce for*
 21 *Oceans and Atmosphere.*

22 “(7) *WEATHER INDUSTRY AND WEATHER ENTER-*
 23 *PRISE.*—*The terms ‘weather industry’ and ‘weather*
 24 *enterprise’ are interchangeable in this section and in-*
 25 *clude individuals and organizations from public, pri-*

vate, and academic sectors that contribute to the research, development, and production of weather forecast products, and primary consumers of these weather forecast products.

“(j) *AUTHORIZATION OF APPROPRIATIONS.*—For each of fiscal years 2017 and 2018, there are authorized out of funds appropriated to the National Weather Service, \$26,500,000 to carry out the activities of this section.”.

TITLE III—WEATHER SATELLITE AND DATA INNOVATION

SEC. 301. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITE AND DATA MANAGEMENT.

(a) SHORT-TERM MANAGEMENT OF ENVIRONMENTAL OBSERVATIONS.—

(1) MICROSATELLITE CONSTELLATIONS.—

(A) *IN GENERAL.*—The Under Secretary shall complete and operationalize the Constellation Observing System for Meteorology, Ionosphere, and Climate–1 and Climate–2 (COSMIC) in effect on the day before the date of the enactment of this Act—

(i) by deploying constellations of microsatellites in both the equatorial and polar orbits;

(ii) by integrating the resulting data and research into all national operational and research weather forecast models; and

(iii) by ensuring that the resulting data of National Oceanic and Atmospheric Administration's COSMIC-1 and COSMIC-2 programs are free and open to all communities.

(B) ANNUAL REPORTS.—Not less frequently than once each year until the Under Secretary has completed and operationalized the program described in subparagraph (A) pursuant to such subparagraph, the Under Secretary shall submit to Congress a report on the status of the efforts of the Under Secretary to carry out such subparagraph.

(2) INTEGRATION OF OCEAN AND COASTAL DATA FROM THE INTEGRATED OCEAN OBSERVING SYSTEM.—In National Weather Service Regions where the Director of the National Weather Service determines that ocean and coastal data would improve forecasts, the Director, in consultation with the Assistant Administrator for Oceanic and Atmospheric Research and the Assistant Administrator of the National Ocean Service, shall—

(A) *integrate additional coastal and ocean observations, and other data and research, from the Integrated Ocean Observing System (IOOS) into regional weather forecasts to improve weather forecasts and forecasting decision support systems; and*

(B) *support the development of real-time data sharing products and forecast products in collaboration with the regional associations of such system, including contributions from the private sector, academia, and research institutions to ensure timely and accurate use of ocean and coastal data in regional forecasts.*

(3) *EXISTING MONITORING AND OBSERVATION-CAPABILITY.—The Under Secretary shall identify degradation of existing monitoring and observation capabilities that could lead to a reduction in forecast quality.*

(4) *SPECIFICATIONS FOR NEW SATELLITE SYSTEMS OR DATA DETERMINED BY OPERATIONAL NEEDS.—In developing specifications for any satellite systems or data to follow the Joint Polar Satellite System, Geostationary Operational Environmental Satellites, and any other satellites, in effect on the day before the date of enactment of this Act, the*

1 *Under Secretary shall ensure the specifications are*
 2 *determined to the extent practicable by the rec-*
 3 *ommendations of the reports under subsection (b) of*
 4 *this section.*

5 ***(b) INDEPENDENT STUDY ON FUTURE OF NATIONAL***
 6 ***OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITE***
 7 ***SYSTEMS AND DATA.—***

8 ***(1) AGREEMENT.—***

9 ***(A) IN GENERAL.—****The Under Secretary*
 10 *shall seek to enter into an agreement with the*
 11 *National Academy of Sciences to perform the*
 12 *services covered by this subsection.*

13 ***(B) TIMING.—****The Under Secretary shall*
 14 *seek to enter into the agreement described in sub-*
 15 *paragraph (A) before September 30, 2018.*

16 ***(2) STUDY.—***

17 ***(A) IN GENERAL.—****Under an agreement be-*
 18 *tween the Under Secretary and the National*
 19 *Academy of Sciences under this subsection, the*
 20 *National Academy of Sciences shall conduct a*
 21 *study on matters concerning future satellite data*
 22 *needs.*

23 ***(B) ELEMENTS.—****In conducting the study*
 24 *under subparagraph (A), the National Academy*
 25 *of Sciences shall—*

1 (i) develop recommendations on how to
2 make the data portfolio of the Administra-
3 tion more robust and cost-effective;

4 (ii) assess the costs and benefits of
5 moving toward a constellation of many
6 small satellites, standardizing satellite bus
7 design, relying more on the purchasing of
8 data, or acquiring data from other sources
9 or methods;

10 (iii) identify the environmental obser-
11 vations that are essential to the performance
12 of weather models, based on an assessment
13 of Federal, academic, and private sector
14 weather research, and the cost of obtaining
15 the environmental data;

16 (iv) identify environmental observa-
17 tions that improve the quality of oper-
18 ational and research weather models in ef-
19 fect on the day before the date of enactment
20 of this Act;

21 (v) identify and prioritize new envi-
22 ronmental observations that could con-
23 tribute to existing and future weather mod-
24 els; and

(vi) develop recommendations on a portfolio of environmental observations that balances essential, quality-improving, and new data, private and nonprivate sources, and space-based and Earth-based sources.

(C) DEADLINE AND REPORT.—In carrying out the study under subparagraph (A), the National Academy of Sciences shall complete and transmit to the Under Secretary a report containing the findings of the National Academy of Sciences with respect to the study not later than 2 years after the date on which the Administrator enters into an agreement with the National Academy of Sciences under paragraph (1)(A).

(3) ALTERNATE ORGANIZATION.—

(A) IN GENERAL.—If the Under Secretary is unable within the period prescribed in subparagraph (B) of paragraph (1) to enter into an agreement described in subparagraph (A) of such paragraph with the National Academy of Sciences on terms acceptable to the Under Secretary, the Under Secretary shall seek to enter into such an agreement with another appropriate organization that—

1 (i) is not part of the Federal Govern-
2 ment;

3 (ii) operates as a not-for-profit entity;
4 and

5 (iii) has expertise and objectivity com-
6 parable to that of the National Academy of
7 Sciences.

8 (B) *TREATMENT.*—If the Under Secretary
9 enters into an agreement with another organiza-
10 tion as described in subparagraph (A), any ref-
11 erence in this subsection to the National Acad-
12 emy of Sciences shall be treated as a reference to
13 the other organization.

14 (4) *AUTHORIZATION OF APPROPRIATIONS.*—
15 There are authorized to be appropriated, out of funds
16 appropriated to National Environmental Satellite,
17 Data, and Information Service, to carry out this sub-
18 section \$1,000,000 for the period encompassing fiscal
19 years 2018 through 2019.

20 **SEC. 302. COMMERCIAL WEATHER DATA.**

21 (a) *DATA AND HOSTED SATELLITE PAYLOADS.*—Not-
22 withstanding any other provision of law, the Secretary of
23 Commerce may enter into agreements for—

24 (1) the purchase of weather data through con-
25 tracts with commercial providers; and

1 (2) *the placement of weather satellite instru-*
2 *ments on cohosted government or private payloads.*

3 (b) *STRATEGY.*—

4 (1) *IN GENERAL.*—*Not later than 180 days after*
5 *the date of the enactment of this Act, the Secretary of*
6 *Commerce, in consultation with the Under Secretary,*
7 *shall submit to the Committee on Commerce, Science,*
8 *and Transportation of the Senate and the Committee*
9 *on Science, Space, and Technology of the House of*
10 *Representatives a strategy to enable the procurement*
11 *of quality commercial weather data. The strategy*
12 *shall assess the range of commercial opportunities, in-*
13 *cluding public-private partnerships, for obtaining*
14 *surface-based, aviation-based, and space-based weath-*
15 *er observations. The strategy shall include the ex-*
16 *pected cost-effectiveness of these opportunities as well*
17 *as provide a plan for procuring data, including an*
18 *expected implementation timeline, from these non-*
19 *governmental sources, as appropriate.*

20 (2) *REQUIREMENTS.*—*The strategy shall in-*
21 *clude—*

22 (A) *an analysis of financial or other bene-*
23 *fits to, and risks associated with, acquiring com-*
24 *mercial weather data or services, including*
25 *through multiyear acquisition approaches;*

1 (B) an identification of methods to address
2 planning, programming, budgeting, and execu-
3 tion challenges to such approaches, including—

4 (i) how standards will be set to ensure
5 that data is reliable and effective;

6 (ii) how data may be acquired through
7 commercial experimental or innovative tech-
8 niques and then evaluated for integration
9 into operational use;

10 (iii) how to guarantee public access to
11 all forecast-critical data to ensure that the
12 United States weather industry and the
13 public continue to have access to informa-
14 tion critical to their work; and

15 (iv) in accordance with section 50503
16 of title 51, United States Code, methods to
17 address potential termination liability or
18 cancellation costs associated with weather
19 data or service contracts; and

20 (C) an identification of any changes needed
21 in the requirements development and approval
22 processes of the Department of Commerce to fa-
23 cilitate effective and efficient implementation of
24 such strategy.

1 (3) *AUTHORITY FOR AGREEMENTS.*—*The Assist-*
2 *ant Administrator for National Environmental Sat-*
3 *ellite, Data, and Information Service may enter into*
4 *multiyear agreements necessary to carry out the strat-*
5 *egy developed under this subsection.*

6 (c) *PILOT PROGRAM.*—

7 (1) *CRITERIA.*—*Not later than 30 days after the*
8 *date of the enactment of this Act, the Under Secretary*
9 *shall publish data and metadata standards and speci-*
10 *fications for space-based commercial weather data, in-*
11 *cluding radio occultation data, and, as soon as pos-*
12 *sible, geostationary hyperspectral sounder data.*

13 (2) *PILOT CONTRACTS.*—

14 (A) *CONTRACTS.*—*Not later than 90 days*
15 *after the date of enactment of this Act, the Under*
16 *Secretary shall, through an open competition,*
17 *enter into at least one pilot contract with one or*
18 *more private sector entities capable of providing*
19 *data that meet the standards and specifications*
20 *set by the Under Secretary for providing com-*
21 *mercial weather data in a manner that allows*
22 *the Under Secretary to calibrate and evaluate*
23 *the data for its use in National Oceanic and At-*
24 *mospheric Administration meteorological models.*

1 (B) *ASSESSMENT OF DATA VIABILITY.*—Not
2 later than the date that is 3 years after the date
3 on which the Under Secretary enters into a con-
4 tract under subparagraph (A), the Under Sec-
5 retary shall assess and submit to the Committee
6 on Commerce, Science, and Transportation of
7 the Senate and the Committee on Science, Space,
8 and Technology of the House of Representatives
9 the results of a determination of the extent to
10 which data provided under the contract entered
11 into under subparagraph (A) meet the criteria
12 published under paragraph (1) and the extent to
13 which the pilot program has demonstrated—

14 (i) the viability of assimilating the
15 commercially provided data into National
16 Oceanic and Atmospheric Administration
17 meteorological models;

18 (ii) whether, and by how much, the
19 data add value to weather forecasts; and

20 (iii) the accuracy, quality, timeliness,
21 validity, reliability, usability, information
22 technology security, and cost-effectiveness of
23 obtaining commercial weather data from
24 private sector providers.

1 (3) *AUTHORIZATION OF APPROPRIATIONS.*—*For*
2 *each of fiscal years 2017 through 2020, there are au-*
3 *thorized to be appropriated for procurement, acquisi-*
4 *tion, and construction at National Environmental*
5 *Satellite, Data, and Information Service, \$6,000,000*
6 *to carry out this subsection.*

7 (d) *OBTAINING FUTURE DATA.*—*If an assessment*
8 *under subsection (c)(2)(B) demonstrates the ability of com-*
9 *mercial weather data to meet data and metadata standards*
10 *and specifications published under subsection (c)(1), the*
11 *Under Secretary shall—*

12 (1) *where appropriate, cost-effective, and feasible,*
13 *obtain commercial weather data from private sector*
14 *providers;*

15 (2) *as early as possible in the acquisition process*
16 *for any future National Oceanic and Atmospheric Ad-*
17 *ministration meteorological space system, consider*
18 *whether there is a suitable, cost-effective, commercial*
19 *capability available or that will be available to meet*
20 *any or all of the observational requirements by the*
21 *planned operational date of the system;*

22 (3) *if a suitable, cost-effective, commercial capa-*
23 *bility is or will be available as described in para-*
24 *graph (2), determine whether it is in the national in-*

1 *terest to develop a governmental meteorological space*
 2 *system; and*

3 *(4) submit to the Committee on Commerce,*
 4 *Science, and Transportation of the Senate and the*
 5 *Committee on Science, Space, and Technology of the*
 6 *House of Representatives a report detailing any deter-*
 7 *mination made under paragraphs (2) and (3).*

8 *(e) DATA SHARING PRACTICES.—The Under Secretary*
 9 *shall continue to meet the international meteorological*
 10 *agreements into which the Under Secretary has entered, in-*
 11 *cluding practices set forth through World Meteorological Or-*
 12 *ganization Resolution 40.*

13 **SEC. 303. UNNECESSARY DUPLICATION.**

14 *In meeting the requirements under this title, the Under*
 15 *Secretary shall avoid unnecessary duplication between pub-*
 16 *lic and private sources of data and the corresponding ex-*
 17 *penditure of funds and employment of personnel.*

18 **TITLE IV—FEDERAL WEATHER**
 19 **COORDINATION**

20 **SEC. 401. ENVIRONMENTAL INFORMATION SERVICES WORK-**
 21 **ING GROUP.**

22 *(a) ESTABLISHMENT.—The National Oceanic and At-*
 23 *mospheric Administration Science Advisory Board shall*
 24 *continue to maintain a standing working group named the*

1 *Environmental Information Services Working Group (in*
 2 *this section referred to as the “Working Group”)—*

3 *(1) to provide advice for prioritizing weather re-*
 4 *search initiatives at the National Oceanic and Atmos-*
 5 *pheric Administration to produce real improvement*
 6 *in weather forecasting;*

7 *(2) to provide advice on existing or emerging*
 8 *technologies or techniques that can be found in pri-*
 9 *rate industry or the research community that could*
 10 *be incorporated into forecasting at the National*
 11 *Weather Service to improve forecasting skill;*

12 *(3) to identify opportunities to improve—*

13 *(A) communications between weather fore-*
 14 *casters, Federal, State, local, tribal, and other*
 15 *emergency management personnel, and the pub-*
 16 *lic; and*

17 *(B) communications and partnerships*
 18 *among the National Oceanic and Atmospheric*
 19 *Administration and the private and academic*
 20 *sectors; and*

21 *(4) to address such other matters as the Science*
 22 *Advisory Board requests of the Working Group.*

23 *(b) COMPOSITION.—*

24 *(1) IN GENERAL.—The Working Group shall be*
 25 *composed of leading experts and innovators from all*

1 *relevant fields of science and engineering including*
2 *atmospheric chemistry, atmospheric physics, meteor-*
3 *ology, hydrology, social science, risk communications,*
4 *electrical engineering, and computer sciences. In car-*
5 *rying out this section, the Working Group may orga-*
6 *nize into subpanels.*

7 (2) *NUMBER.—The Working Group shall be com-*
8 *posed of no fewer than 15 members. Nominees for the*
9 *Working Group may be forwarded by the Working*
10 *Group for approval by the Science Advisory Board.*
11 *Members of the Working Group may choose a chair*
12 *(or co-chairs) from among their number with ap-*
13 *proval by the Science Advisory Board.*

14 (c) *ANNUAL REPORT.—Not less frequently than once*
15 *each year, the Working Group shall transmit to the Science*
16 *Advisory Board for submission to the Under Secretary a*
17 *report on progress made by National Oceanic and Atmos-*
18 *pheric Administration in adopting the Working Group's*
19 *recommendations. The Science Advisory Board shall trans-*
20 *mit this report to the Under Secretary. Within 30 days of*
21 *receipt of such report, the Under Secretary shall submit to*
22 *the Committee on Commerce, Science, and Transportation*
23 *of the Senate and the Committee on Science, Space, and*
24 *Technology of the House of Representatives a copy of such*
25 *report.*

1 **SEC. 402. INTERAGENCY WEATHER RESEARCH AND FORE-**
2 **CAST INNOVATION COORDINATION.**

3 (a) *ESTABLISHMENT.*—*The Director of the Office of*
4 *Science and Technology Policy shall establish an Inter-*
5 *agency Committee for Advancing Weather Services to im-*
6 *prove coordination of relevant weather research and forecast*
7 *innovation activities across the Federal Government. The*
8 *Interagency Committee shall—*

9 (1) *include participation by the National Aero-*
10 *navitics and Space Administration, the Federal Avia-*
11 *tion Administration, National Oceanic and Atmos-*
12 *pheric Administration and its constituent elements,*
13 *the National Science Foundation, and such other*
14 *agencies involved in weather forecasting research as*
15 *the President determines are appropriate;*

16 (2) *identify and prioritize top forecast needs and*
17 *coordinate those needs against budget requests and*
18 *program initiatives across participating offices and*
19 *agencies; and*

20 (3) *share information regarding operational*
21 *needs and forecasting improvements across relevant*
22 *agencies.*

23 (b) *CO-CHAIR.*—*The Federal Coordinator for Meteor-*
24 *ology shall serve as a co-chair of this panel.*

25 (c) *FURTHER COORDINATION.*—*The Director of the Of-*
26 *fice of Science and Technology Policy shall take such other*

1 *steps as are necessary to coordinate the activities of the Fed-*
 2 *eral Government with those of the United States weather*
 3 *industry, State governments, emergency managers, and*
 4 *academic researchers.*

5 **SEC. 403. OFFICE OF OCEANIC AND ATMOSPHERIC RE-**
 6 **SEARCH AND NATIONAL WEATHER SERVICE**
 7 **EXCHANGE PROGRAM.**

8 (a) *IN GENERAL.*—*The Assistant Administrator for*
 9 *Oceanic and Atmospheric Research and the Director of Na-*
 10 *tional Weather Service may establish a program to detail*
 11 *Office of Oceanic and Atmospheric Research personnel to*
 12 *the National Weather Service and National Weather Service*
 13 *personnel to the Office of Oceanic and Atmospheric Re-*
 14 *search.*

15 (b) *GOAL.*—*The goal of this program is to enhance*
 16 *forecasting innovation through regular, direct interaction*
 17 *between the Office of Oceanic and Atmospheric Research’s*
 18 *world-class scientists and the National Weather Service’s*
 19 *operational staff.*

20 (c) *ELEMENTS.*—*The program shall allow up to 10 Of-*
 21 *fice of Oceanic and Atmospheric Research staff and Na-*
 22 *tional Weather Service staff to spend up to 1 year on detail.*
 23 *Candidates shall be jointly selected by the Assistant Admin-*
 24 *istrator for Oceanic and Atmospheric Research and the Di-*
 25 *rector of the National Weather Service.*

(a) *IN GENERAL.—The Director of the National Weather Service may establish a program to host postdoctoral fellows and academic researchers at any of the National Centers for Environmental Prediction.*

19 (c) *SELECTION AND APPOINTMENT.*—*Such fellows*
20 *shall be competitively selected and appointed for a term not*
21 *to exceed 1 year.*

1 **SEC. 405. WARNING COORDINATION METEOROLOGISTS AT**
2 **WEATHER FORECAST OFFICES OF NATIONAL**
3 **WEATHER SERVICE.**

4 (a) *DESIGNATION OF WARNING COORDINATION METE-*
5 *OROLOGISTS.—*

6 (1) *IN GENERAL.—The Director of the National*
7 *Weather Service shall designate at least one warning*
8 *coordination meteorologist at each weather forecast of-*
9 *fice of the National Weather Service.*

10 (2) *NO ADDITIONAL EMPLOYEES AUTHORIZED.—*
11 *Nothing in this section shall be construed to authorize*
12 *or require a change in the authorized number of full*
13 *time equivalent employees in the National Weather*
14 *Service or otherwise result in the employment of any*
15 *additional employees.*

16 (3) *PERFORMANCE BY OTHER EMPLOYEES.—Per-*
17 *formance of the responsibilities outlined in this sec-*
18 *tion is not limited to the warning coordination mete-*
19 *orologist position.*

20 (b) *PRIMARY ROLE OF WARNING COORDINATION ME-*
21 *TEOROLOGISTS.—The primary role of the warning coordi-*
22 *nation meteorologist shall be to carry out the responsibil-*
23 *ities required by this section.*

24 (c) *RESPONSIBILITIES.—*

25 (1) *IN GENERAL.—Subject to paragraph (2), con-*
26 *sistent with the analysis described in section 409, and*

1 *in order to increase impact-based decision support*
2 *services, each warning coordination meteorologist des-*
3 *ignated under subsection (a) shall—*

4 *(A) be responsible for providing service to*
5 *the geographic area of responsibility covered by*
6 *the weather forecast office at which the warning*
7 *coordination meteorologist is employed to help*
8 *ensure that users of products of the National*
9 *Weather Service can respond effectively to im-*
10 *prove outcomes from weather events;*

11 *(B) liaise with users of products and serv-*
12 *ices of the National Weather Service, such as the*
13 *public, media outlets, users in the aviation, ma-*
14 *rine, and agricultural communities, and for-*
15 *estry, land, and water management interests, to*
16 *evaluate the adequacy and usefulness of the prod-*
17 *ucts and services of the National Weather Serv-*
18 *ice;*

19 *(C) collaborate with such weather forecast*
20 *offices and State, local, and tribal government*
21 *agencies as the Director considers appropriate in*
22 *developing, proposing, and implementing plans*
23 *to develop, modify, or tailor products and serv-*
24 *ices of the National Weather Service to improve*
25 *the usefulness of such products and services;*

1 (D) ensure the maintenance and accuracy
 2 of severe weather call lists, appropriate office se-
 3 vere weather policy or procedures, and other se-
 4 vere weather or dissemination methodologies or
 5 strategies; and

6 (E) work closely with State, local, and trib-
 7 al emergency management agencies, and other
 8 agencies related to disaster management, to en-
 9 sure a planned, coordinated, and effective pre-
 10 paredness and response effort.

11 (2) *OTHER STAFF.*—The Director may assign a
 12 responsibility set forth in paragraph (1) to such other
 13 staff as the Director considers appropriate to carry
 14 out such responsibility.

15 (d) *ADDITIONAL RESPONSIBILITIES.*—

16 (1) *IN GENERAL.*—Subject to paragraph (2), a
 17 warning coordination meteorologist designated under
 18 subsection (a) may—

19 (A) work with a State agency to develop
 20 plans for promoting more effective use of prod-
 21 ucts and services of the National Weather Service
 22 throughout the State;

23 (B) identify priority community prepared-
 24 ness objectives;

1 (C) develop plans to meet the objectives
2 identified under paragraph (2); and

3 (D) conduct severe weather event prepared-
4 ness planning and citizen education efforts with
5 and through various State, local, and tribal gov-
6 ernment agencies and other disaster manage-
7 ment-related organizations.

8 (2) *OTHER STAFF.*—*The Director may assign a*
9 *responsibility set forth in paragraph (1) to such other*
10 *staff as the Director considers appropriate to carry*
11 *out such responsibility.*

12 (e) *PLACEMENT WITH STATE AND LOCAL EMERGENCY*
13 *MANAGERS.*—

14 (1) *IN GENERAL.*—*In carrying out this section,*
15 *the Director of the National Weather Service may*
16 *place a warning coordination meteorologist des-*
17 *ignated under subsection (a) with a State or local*
18 *emergency manager if the Director considers doing so*
19 *is necessary or convenient to carry out this section.*

20 (2) *TREATMENT.*—*If the Director determines*
21 *that the placement of a warning coordination mete-*
22 *orologist placed with a State or local emergency man-*
23 *ager under paragraph (1) is near a weather forecast*
24 *office of the National Weather Service, such placement*
25 *shall be treated as designation of the warning coordi-*

1 *nation meteorologist at such weather forecast office for*
 2 *purposes of subsection (a).*

3 **SEC. 406. IMPROVING NATIONAL OCEANIC AND ATMOS-**
 4 **SPHERIC ADMINISTRATION COMMUNICATION**
 5 **OF HAZARDOUS WEATHER AND WATER**
 6 **EVENTS.**

7 *(a) PURPOSE OF SYSTEM.—For purposes of the assess-*
 8 *ment required by subsection (b)(1)(A), the purpose of Na-*
 9 *tional Oceanic and Atmospheric Administration system for*
 10 *issuing watches and warnings regarding hazardous weather*
 11 *and water events shall be risk communication to the general*
 12 *public that informs action to prevent loss of life and prop-*
 13 *erty.*

14 *(b) ASSESSMENT OF SYSTEM.—*

15 *(1) IN GENERAL.—Not later than 2 years after*
 16 *the date of the enactment of this Act, the Under Sec-*
 17 *retary shall—*

18 *(A) assess the National Oceanic and Atmos-*
 19 *pheric Administration system for issuing watch-*
 20 *es and warnings regarding hazardous weather*
 21 *and water events; and*

22 *(B) submit to Congress a report on the find-*
 23 *ings of the Under Secretary with respect to the*
 24 *assessment conducted under subparagraph (A).*

1 (2) *ELEMENTS.*—*The assessment required by*
 2 *paragraph (1)(A) shall include the following:*

3 (A) *An evaluation of whether the National*
 4 *Oceanic and Atmospheric Administration system*
 5 *for issuing watches and warnings regarding haz-*
 6 *ardous weather and water events meets the pur-*
 7 *pose described in subsection (a).*

8 (B) *Development of recommendations for—*

9 (i) *legislative and administrative ac-*
 10 *tion to improve the system described in*
 11 *paragraph (1)(A); and*

12 (ii) *such research as the Under Sec-*
 13 *retary considers necessary to address the*
 14 *focus areas described in paragraph (3).*

15 (3) *FOCUS AREAS.*—*The assessment required by*
 16 *paragraph (1)(A) shall focus on the following:*

17 (A) *Ways to communicate the risks posed by*
 18 *hazardous weather or water events to the public*
 19 *that are most likely to result in action to miti-*
 20 *gate the risk.*

21 (B) *Ways to communicate the risks posed*
 22 *by hazardous weather or water events to the pub-*
 23 *lic as broadly and rapidly as practicable.*

24 (C) *Ways to preserve the benefits of the ex-*
 25 *isting watches and warnings system.*

1 (D) *Ways to maintain the utility of the*
2 *watches and warnings system for Government*
3 *and commercial users of the system.*

4 (4) *CONSULTATION.—In conducting the assess-*
5 *ment required by paragraph (1)(A), the Under Sec-*
6 *retary shall—*

7 (A) *consult with such line offices within the*
8 *National Oceanic and Atmospheric Administra-*
9 *tion as the Under Secretary considers relevant,*
10 *including the National Ocean Service, the Na-*
11 *tional Weather Service, and the Office of Oceanic*
12 *and Atmospheric Research;*

13 (B) *consult with individuals in the aca-*
14 *demic sector, including individuals in the field*
15 *of social and behavioral sciences, and other*
16 *weather services;*

17 (C) *consult with media outlets that will be*
18 *distributing the watches and warnings;*

19 (D) *consult with non-Federal forecasters*
20 *that produce alternate severe weather risk com-*
21 *munication products;*

22 (E) *consult with emergency planners and*
23 *responders, including State and local emergency*
24 *management agencies, and other government*
25 *users of the watches and warnings system, in-*

cluding the Federal Emergency Management Agency, the Office of Personnel Management, the Coast Guard, and such other Federal agencies as the Under Secretary determines rely on watches and warnings for operational decisions; and

(F) make use of the services of the National Academy of Sciences, as the Under Secretary considers necessary and practicable, including contracting with the National Research Council to review the scientific and technical soundness of the assessment required by paragraph (1)(A), including the recommendations developed under paragraph (2)(B).

(5) *METHODOLOGIES.*—In conducting the assessment required by paragraph (1)(A), the Under Secretary shall use such methodologies as the Under Secretary considers are generally accepted by the weather enterprise, including social and behavioral sciences.

(c) *IMPROVEMENTS TO SYSTEM.*—

(1) *IN GENERAL.*—The Under Secretary shall, based on the assessment required by subsection (b)(1)(A), make such recommendations to Congress to improve the system as the Under Secretary considers necessary—

(A) to improve the system for issuing watches and warnings regarding hazardous weather and water events; and

(B) to support efforts to satisfy research needs to enable future improvements to such system.

(2) *REQUIREMENTS REGARDING RECOMMENDATIONS.*—In carrying out paragraph (1)(A), the Under Secretary shall ensure that any recommendation that the Under Secretary considers a major change—

(A) is validated by social and behavioral science using a generalizable sample;

(B) accounts for the needs of various demographics, vulnerable populations, and geographic regions;

(C) accounts for the differences between types of weather and water hazards;

(D) responds to the needs of Federal, State, and local government partners and media partners; and

(E) accounts for necessary changes to Federally operated watch and warning propagation and dissemination infrastructure and protocols.

(d) *WATCHES AND WARNINGS DEFINED.*—

(1) *IN GENERAL.*—*Except as provided in paragraph (2), in this section, the terms “watch” and “warning”, with respect to a hazardous weather and water event, mean products issued by the Administration, intended for consumption by the general public, to alert the general public to the potential for or presence of the event and to inform action to prevent loss of life and property.*

(2) *EXCEPTION.*—*In this section, the terms “watch” and “warning” do not include technical or specialized meteorological and hydrological forecasts, outlooks, or model guidance products.*

SEC. 407. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION WEATHER READY ALL HAZARDS AWARD PROGRAM.

(a) *PROGRAM.*—*The Director of the National Weather Service is authorized to establish the National Oceanic and Atmospheric Administration Weather Ready All Hazards Award Program. This award program shall provide annual awards to honor individuals or organizations that use or provide National Oceanic and Atmospheric Administration Weather Radio All Hazards receivers or transmitters to save lives and protect property. Individuals or organizations that utilize other early warning tools or applications also qualify for this award.*

1 (b) *GOAL.*—*This award program draws attention to*
 2 *the life-saving work of the National Oceanic and Atmos-*
 3 *pheric Administration Weather Ready All Hazards Pro-*
 4 *gram, as well as emerging tools and applications, that pro-*
 5 *vide real-time warning to individuals and communities of*
 6 *severe weather or other hazardous conditions.*

7 (c) *PROGRAM ELEMENTS.*—

8 (1) *NOMINATIONS.*—*Nominations for this award*
 9 *shall be made annually by the Weather Field Offices*
 10 *to the Director of the National Weather Service.*
 11 *Broadcast meteorologists, weather radio manufactur-*
 12 *ers and weather warning tool and application devel-*
 13 *opers, emergency managers, and public safety officials*
 14 *may nominate individuals or organizations to their*
 15 *local Weather Field Offices, but the final list of award*
 16 *nominees must come from the Weather Field Offices.*

17 (2) *SELECTION OF AWARDEES.*—*Annually, the*
 18 *Director of the National Weather Service shall choose*
 19 *winners of this award whose timely actions, based on*
 20 *National Oceanic and Atmospheric Administration*
 21 *Weather Radio All Hazards receivers or transmitters*
 22 *or other early warning tools and applications, saved*
 23 *lives or property, or demonstrated public service in*
 24 *support of weather or all hazard warnings.*

1 (3) *AWARD CEREMONY.*—*The Director of the Na-*
 2 *tional Weather Service shall establish a means of*
 3 *making these awards to provide maximum public*
 4 *awareness of the importance of National Oceanic and*
 5 *Atmospheric Administration Weather Radio, and*
 6 *such other warning tools and applications as are rep-*
 7 *resented in the awards.*

8 **SEC. 408. DEPARTMENT OF DEFENSE WEATHER FORE-**
 9 **CASTING ACTIVITIES.**

10 *Not later than 60 days after the date of the enactment*
 11 *of this Act, the Under Secretary shall submit to the Com-*
 12 *mittee on Commerce, Science, and Transportation of the*
 13 *Senate and the Committee on Science, Space, and Tech-*
 14 *nology of the House of Representatives a report analyzing*
 15 *the impacts of the proposed Air Force divestiture in the*
 16 *United States Weather Research and Forecasting Model, in-*
 17 *cluding—*

18 (1) *the impact on—*

19 (A) *the United States weather forecasting*
 20 *capabilities;*

21 (B) *the accuracy of civilian regional fore-*
 22 *casts;*

23 (C) *the civilian readiness for traditional*
 24 *weather and extreme weather events in the*
 25 *United States; and*

1 (D) the research necessary to develop the
 2 United States Weather Research and Forecasting
 3 Model; and
 4 (2) such other analysis relating to the divestiture
 5 as the Under Secretary considers appropriate.

6 **SEC. 409. NATIONAL WEATHER SERVICE; OPERATIONS AND**
 7 **WORKFORCE ANALYSIS.**

8 The Under Secretary shall contract or continue to
 9 partner with an external organization to conduct a baseline
 10 analysis of National Weather Service operations and work-
 11 force.

12 **SEC. 410. REPORT ON CONTRACT POSITIONS AT NATIONAL**
 13 **WEATHER SERVICE.**

14 (a) *REPORT REQUIRED.*—Not later than 180 days
 15 after the date of the enactment of this Act, the Under Sec-
 16 retary shall submit to Congress a report on the use of con-
 17 tractors at the National Weather Service for the most re-
 18 cently completed fiscal year.

19 (b) *CONTENTS.*—The report required by subsection (a)
 20 shall include, with respect to the most recently completed
 21 fiscal year, the following:

22 (1) The total number of full-time equivalent em-
 23 ployees at the National Weather Service,
 24 disaggregated by each equivalent level of the General
 25 Schedule.

1 (2) *The total number of full-time equivalent con-*
2 *tractors at the National Weather Service,*
3 *disaggregated by each equivalent level of the General*
4 *Schedule that most closely approximates their duties.*

5 (3) *The total number of vacant positions at the*
6 *National Weather Service on the day before the date*
7 *of enactment of this Act, disaggregated by each equiv-*
8 *alent level of the General Schedule.*

9 (4) *The five most common positions filled by*
10 *full-time equivalent contractors at the National*
11 *Weather Service and the equivalent level of the Gen-*
12 *eral Schedule that most closely approximates the du-*
13 *ties of such positions.*

14 (5) *Of the positions identified under paragraph*
15 *(4), the percentage of full-time equivalent contractors*
16 *in those positions that have held a prior position at*
17 *the National Weather Service or another entity in*
18 *National Oceanic and Atmospheric Administration.*

19 (6) *The average full-time equivalent salary for*
20 *Federal employees at the National Weather Service for*
21 *each equivalent level of the General Schedule.*

22 (7) *The average salary for full-time equivalent*
23 *contractors performing at each equivalent level of the*
24 *General Schedule at the National Weather Service.*

(8) *A description of any actions taken by the Under Secretary to respond to the issues raised by the Inspector General of the Department of Commerce regarding the hiring of former National Oceanic and Atmospheric Administration employees as contractors at the National Weather Service such as the issues raised in the Investigative Report dated June 2, 2015 (OIG–12–0447).*

(c) *ANNUAL PUBLICATION.—For each fiscal year after the fiscal year covered by the report required by subsection (a), the Under Secretary shall, not later than 180 days after the completion of the fiscal year, publish on a publicly accessible Internet website the information described in paragraphs (1) through (8) of subsection (b) for such fiscal year.*

**SEC. 411. WEATHER IMPACTS TO COMMUNITIES AND INFRA-
STRUCTURE.**

(a) *REVIEW.—*

(1) *IN GENERAL.—The Director of the National Weather Service shall review existing research, products, and services that meet the specific needs of the urban environment, given its unique physical characteristics and forecasting challenges.*

(2) *ELEMENTS.—The review required by paragraph (1) shall include research, products, and services with the potential to improve modeling and fore-*

1 *casting capabilities, taking into account factors in-*
 2 *cluding varying building heights, impermeable sur-*
 3 *faces, lack of tree canopy, traffic, pollution, and inter-*
 4 *building wind effects.*

5 *(b) REPORT AND ASSESSMENT.—Upon completion of*
 6 *the review required by subsection (a), the Under Secretary*
 7 *shall submit to Congress a report on the research, products,*
 8 *and services of the National Weather Service, including an*
 9 *assessment of such research, products, and services that is*
 10 *based on the review, public comment, and recent publica-*
 11 *tions by the National Academy of Sciences.*

12 **SEC. 412. WEATHER ENTERPRISE OUTREACH.**

13 *(a) IN GENERAL.—The Under Secretary may establish*
 14 *mechanisms for outreach to the weather enterprise—*

15 *(1) to assess the weather forecasts and forecast*
 16 *products provided by the National Oceanic and At-*
 17 *mospheric Administration; and*

18 *(2) to determine the highest priority weather*
 19 *forecast needs of the community described in sub-*
 20 *section (b).*

21 *(b) OUTREACH COMMUNITY.—In conducting outreach*
 22 *under subsection (a), the Under Secretary shall contact*
 23 *leading experts and innovators from relevant stakeholders,*
 24 *including the representatives from the following:*

1 (1) *State or local emergency management agen-*
 2 *cies.*

3 (2) *State agriculture agencies.*

4 (3) *Indian tribes (as defined in section 4 of the*
 5 *Indian Self-Determination and Education Assistance*
 6 *Act (25 U.S.C. 5304)) and Native Hawaiians (as de-*
 7 *finied in section 6207 of the Elementary and Sec-*
 8 *ondary Education Act of 1965 (20 U.S.C. 7517)).*

9 (4) *The private aerospace industry.*

10 (5) *The private earth observing industry.*

11 (6) *The operational forecasting community.*

12 (7) *The academic community.*

13 (8) *Professional societies that focus on meteor-*
 14 *ology.*

15 (9) *Such other stakeholder groups as the Under*
 16 *Secretary considers appropriate.*

17 **SEC. 413. HURRICANE HUNTER AIRCRAFT.**

18 (a) *BACKUP CAPABILITY.*—*The Under Secretary shall*
 19 *acquire backup for the capabilities of the WP–3D Orion and*
 20 *G–IV hurricane aircraft of the National Oceanic and At-*
 21 *mospheric Administration that is sufficient to prevent a*
 22 *single point of failure.*

23 (b) *AUTHORITY TO ENTER AGREEMENTS.*—*In order to*
 24 *carry out subsection (a), the Under Secretary shall nego-*
 25 *tiate and enter into 1 or more agreements or contracts, to*

1 *the extent practicable and necessary, with governmental*
 2 *and non-governmental entities.*

3 (c) *FUTURE TECHNOLOGY.*—*The Under Secretary*
 4 *shall continue the development of Airborne Phased Array*
 5 *Radar under the United States Weather Research Program.*

6 (d) *AUTHORIZATION OF APPROPRIATIONS.*—*For each*
 7 *of fiscal years 2017 through 2020, support for implementing*
 8 *subsections (a) and (b) is authorized out of funds appro-*
 9 *priated to the Office of Marine and Aviation Operations.*

10 **SEC. 414. STUDY ON GAPS IN NEXRAD COVERAGE AND REC-**
 11 **COMMENDATIONS TO ADDRESS SUCH GAPS.**

12 (a) *STUDY ON GAPS IN NEXRAD COVERAGE.*—

13 (1) *IN GENERAL.*—*Not later than 180 days after*
 14 *the date of the enactment of this Act, the Secretary of*
 15 *Commerce shall complete a study on gaps in the cov-*
 16 *erage of the Next Generation Weather Radar of the*
 17 *National Weather Service (“NEXRAD”).*

18 (2) *ELEMENTS.*—*In conducting the study re-*
 19 *quired under paragraph (1), the Secretary shall—*

20 (A) *identify areas in the United States*
 21 *where limited or no NEXRAD coverage has re-*
 22 *sulted in—*

23 (i) *instances in which no or insuffi-*
 24 *cient warnings were given for hazardous*
 25 *weather events, including tornadoes; or*

1 (ii) degraded forecasts for hazardous
2 weather events that resulted in fatalities,
3 significant injuries, or substantial property
4 damage; and

5 (B) for the areas identified under subpara-
6 graph (A)—

7 (i) identify the key weather effects for
8 which prediction would improve with im-
9 proved radar detection;

10 (ii) identify additional sources of ob-
11 servations for high impact weather that
12 were available and operational for such
13 areas on the day before the date of the en-
14 actment of this Act, including dense net-
15 works of x-band radars, Terminal Doppler
16 Weather Radar (commonly known as
17 “TDWR”), air surveillance radars of the
18 Federal Aviation Administration, and coop-
19 erative network observers;

20 (iii) assess the feasibility and advis-
21 ability of efforts to integrate and upgrade
22 Federal radar capabilities that are not
23 owned or controlled by the National Oceanic
24 and Atmospheric Administration, including
25 radar capabilities of the Federal Aviation

1 *Administration and the Department of De-*
2 *fense;*

3 *(iv) assess the feasibility and advis-*
4 *ability of incorporating State-operated and*
5 *other non-Federal radars into the oper-*
6 *ations of the National Weather Service;*

7 *(v) identify options to improve haz-*
8 *ardous weather detection and forecasting*
9 *coverage; and*

10 *(vi) provide the estimated cost of, and*
11 *timeline for, each of the options identified*
12 *under clause (v).*

13 (3) *REPORT.*—*Upon the completion of the study*
14 *required under paragraph (1), the Secretary shall*
15 *submit to the Committee on Commerce, Science, and*
16 *Transportation of the Senate and the Committee on*
17 *Science, Space, and Technology of the House of Rep-*
18 *resentatives a report that includes the findings of the*
19 *Secretary with respect to the study.*

20 (b) *RECOMMENDATIONS TO IMPROVE RADAR COV-*
21 *ERAGE.*—*Not later than 90 days after the completion of the*
22 *study under subsection (a)(1), the Secretary of Commerce*
23 *shall submit to the congressional committees referred to in*
24 *subsection (a)(3) recommendations for improving haz-*
25 *ardous weather detection and forecasting coverage in the*

1 *areas identified under subsection (a)(2)(A) by integrating*
 2 *additional observation solutions to the extent practicable*
 3 *and meteorologically justified and necessary to protect pub-*
 4 *lic safety.*

5 *(c) THIRD-PARTY CONSULTATION REGARDING REC-*
 6 *COMMENDATIONS TO IMPROVE RADAR COVERAGE.—The Sec-*
 7 *retary of Commerce may seek reviews by, or consult with,*
 8 *appropriate third parties regarding the scientific method-*
 9 *ology relating to, and the feasibility and advisability of im-*
 10 *plementing, the recommendations submitted under sub-*
 11 *section (b), including the extent to which warning and fore-*
 12 *cast services of the National Weather Service would be im-*
 13 *proved by additional observations.*

14 ***TITLE V—TSUNAMI WARNING,***
 15 ***EDUCATION, AND RESEARCH***
 16 ***ACT OF 2017***

17 ***SEC. 501. SHORT TITLE.***

18 *This title may be cited as the “Tsunami Warning,*
 19 *Education, and Research Act of 2017”.*

20 ***SEC. 502. REFERENCES TO THE TSUNAMI WARNING AND***
 21 ***EDUCATION ACT.***

22 *Except as otherwise expressly provided, whenever in*
 23 *this title an amendment or repeal is expressed in terms of*
 24 *an amendment to, or repeal of, a section or other provision,*
 25 *the reference shall be considered to be made to a section or*

1 *other provision of the Tsunami Warning and Education*
2 *Act enacted as title VIII of the Magnuson-Stevens Fishery*
3 *Conservation and Management Reauthorization Act of 2006*
4 *(Public Law 109–479; 33 U.S.C. 3201 et seq.).*

5 **SEC. 503. EXPANSION OF PURPOSES OF TSUNAMI WARNING**
6 **AND EDUCATION ACT.**

7 *Section 803 (33 U.S.C. 3202) is amended—*

8 *(1) in paragraph (1), by inserting “research,”*
9 *after “warnings,”;*

10 *(2) by amending paragraph (2) to read as fol-*
11 *lows:*

12 *“(2) to enhance and modernize the existing*
13 *United States Tsunami Warning System to increase*
14 *the accuracy of forecasts and warnings, to ensure full*
15 *coverage of tsunami threats to the United States with*
16 *a network of detection assets, and to reduce false*
17 *alarms;”;*

18 *(3) by amending paragraph (3) to read as fol-*
19 *lows:*

20 *“(3) to improve and develop standards and*
21 *guidelines for mapping, modeling, and assessment ef-*
22 *forts to improve tsunami detection, forecasting, warn-*
23 *ings, notification, mitigation, resiliency, response,*
24 *outreach, and recovery;”;*

1 (4) by redesignating paragraphs (4), (5), and (6)
2 as paragraphs (5), (6), and (8), respectively;

3 (5) by inserting after paragraph (3) the fol-
4 lowing:

5 “(4) to improve research efforts related to im-
6 proving tsunami detection, forecasting, warnings, no-
7 tification, mitigation, resiliency, response, outreach,
8 and recovery;”;

9 (6) in paragraph (5), as redesignated—

10 (A) by striking “and increase” and insert-
11 ing “, increase, and develop uniform standards
12 and guidelines for”; and

13 (B) by inserting “, including the warning
14 signs of locally generated tsunami” after “ap-
15 proaching”;

16 (7) in paragraph (6), as redesignated, by strik-
17 ing “, including the Indian Ocean; and” and insert-
18 ing a semicolon; and

19 (8) by inserting after paragraph (6), as redesign-
20 ated, the following:

21 “(7) to foster resilient communities in the face of
22 tsunami and other similar coastal hazards; and”.

1 **SEC. 504. MODIFICATION OF TSUNAMI FORECASTING AND**
 2 **WARNING PROGRAM.**

3 (a) *IN GENERAL.*—Subsection (a) of section 804 (33
 4 U.S.C. 3203(a)) is amended by striking “Atlantic Ocean,
 5 Caribbean Sea, and Gulf of Mexico region” and inserting
 6 “Atlantic Ocean region, including the Caribbean Sea and
 7 the Gulf of Mexico”.

8 (b) *COMPONENTS.*—Subsection (b) of section 804 (33
 9 U.S.C. 3203(b)) is amended—

10 (1) in paragraph (1), by striking “established”
 11 and inserting “supported or maintained”;

12 (2) by redesignating paragraphs (7) through (9)
 13 as paragraphs (8) through (10), respectively;

14 (3) by redesignating paragraphs (2) through (6)
 15 as paragraphs (3) through (7), respectively;

16 (4) by inserting after paragraph (1) the fol-
 17 lowing:

18 “(2) to the degree practicable, maintain not less
 19 than 80 percent of the Deep-ocean Assessment and Re-
 20 porting of Tsunamis buoy array at operational ca-
 21 pacity to optimize data reliability;”.

22 (5) by amending paragraph (5), as redesignated
 23 by paragraph (3), to read as follows:

24 “(5) provide tsunami forecasting capability
 25 based on models and measurements, including tsu-
 26 nami inundation models and maps for use in increas-

1 *ing the preparedness of communities and safe-*
 2 *guarding port and harbor operations, that incor-*
 3 *porate inputs, including—*

4 *“(A) the United States and global ocean*
 5 *and coastal observing system;*

6 *“(B) the global Earth observing system;*

7 *“(C) the global seismic network;*

8 *“(D) the Advanced National Seismic sys-*
 9 *tem;*

10 *“(E) tsunami model validation using his-*
 11 *torical and paleotsunami data;*

12 *“(F) digital elevation models and bathym-*
 13 *etry; and*

14 *“(G) newly developing tsunami detection*
 15 *methodologies using satellites and airborne re-*
 16 *mote sensing;”;*

17 *(6) by amending paragraph (7), as redesignated*
 18 *by paragraph (3), to read as follows:*

19 *“(7) include a cooperative effort among the Ad-*
 20 *ministration, the United States Geological Survey,*
 21 *and the National Science Foundation under which*
 22 *the Director of the United States Geological Survey*
 23 *and the Director of the National Science Foundation*
 24 *shall—*

1 “(A) provide rapid and reliable seismic in-
 2 formation to the Administrator from inter-
 3 national and domestic seismic networks; and

4 “(B) support seismic stations installed be-
 5 fore the date of the enactment of the Tsunami
 6 Warning, Education, and Research Act of 2017
 7 to supplement coverage in areas of sparse instru-
 8 mentation;”;

9 (7) in paragraph (8), as redesignated by para-
 10 graph (2)—

11 (A) by inserting “, including graphical
 12 warning products,” after “warnings”;

13 (B) by inserting “, territories,” after
 14 “States”; and

15 (C) by inserting “and Wireless Emergency
 16 Alerts” after “Hazards Program”; and

17 (8) in paragraph (9), as redesignated by para-
 18 graph (2)—

19 (A) by inserting “provide and” before
 20 “allow”; and

21 (B) by inserting “and commercial and Fed-
 22 eral undersea communications cables” after “ob-
 23 serving technologies”.

1 (c) *TSUNAMI WARNING SYSTEM.*—Subsection (c) of
2 section 804 (33 U.S.C. 3203(c)) is amended to read as fol-
3 lows:

4 “(c) *TSUNAMI WARNING SYSTEM.*—The program
5 under this section shall operate a tsunami warning system
6 that—

7 “(1) is capable of forecasting tsunami, including
8 forecasting tsunami arrival time and inundation esti-
9 mates, anywhere in the Pacific and Arctic Ocean re-
10 gions and providing adequate warnings;

11 “(2) is capable of forecasting and providing ade-
12 quate warnings, including tsunami arrival time and
13 inundation models where applicable, in areas of the
14 Atlantic Ocean, including the Caribbean Sea and
15 Gulf of Mexico, that are determined—

16 “(A) to be geologically active, or to have sig-
17 nificant potential for geological activity; and

18 “(B) to pose significant risks of tsunami for
19 States along the coastal areas of the Atlantic
20 Ocean, Caribbean Sea, or Gulf of Mexico; and

21 “(3) supports other international tsunami fore-
22 casting and warning efforts.”.

23 (d) *TSUNAMI WARNING CENTERS.*—Subsection (d) of
24 section 804 (33 U.S.C. 3203(d)) is amended to read as fol-
25 lows:

1 “(d) *TSUNAMI WARNING CENTERS.*—

2 “(1) *IN GENERAL.*—*The Administrator shall*
3 *support or maintain centers to support the tsunami*
4 *warning system required by subsection (c). The Cen-*
5 *ters shall include—*

6 “(A) *the National Tsunami Warning Cen-*
7 *ter, located in Alaska, which is primarily re-*
8 *sponsible for Alaska and the continental United*
9 *States;*

10 “(B) *the Pacific Tsunami Warning Center,*
11 *located in Hawaii, which is primarily respon-*
12 *sible for Hawaii, the Caribbean, and other areas*
13 *of the Pacific not covered by the National Center;*
14 *and*

15 “(C) *any additional forecast and warning*
16 *centers determined by the National Weather*
17 *Service to be necessary.*

18 “(2) *RESPONSIBILITIES.*—*The responsibilities of*
19 *the centers supported or maintained under paragraph*
20 *(1) shall include the following:*

21 “(A) *Continuously monitoring data from*
22 *seismological, deep ocean, coastal sea level, and*
23 *tidal monitoring stations and other data sources*
24 *as may be developed and deployed.*

1 “(B) *Evaluating earthquakes, landslides,*
2 *and volcanic eruptions that have the potential to*
3 *generate tsunami.*

4 “(C) *Evaluating deep ocean buoy data and*
5 *tidal monitoring stations for indications of tsu-*
6 *nami resulting from earthquakes and other*
7 *sources.*

8 “(D) *To the extent practicable, utilizing a*
9 *range of models, including ensemble models, to*
10 *predict tsunami, including arrival times, flood-*
11 *ing estimates, coastal and harbor currents, and*
12 *duration.*

13 “(E) *Using data from the Integrated Ocean*
14 *Observing System of the Administration in co-*
15 *ordination with regional associations to calculate*
16 *new inundation estimates and periodically up-*
17 *date existing inundation estimates.*

18 “(F) *Disseminating forecasts and tsunami*
19 *warning bulletins to Federal, State, tribal, and*
20 *local government officials and the public.*

21 “(G) *Coordinating with the tsunami hazard*
22 *mitigation program conducted under section 805*
23 *to ensure ongoing sharing of information be-*
24 *tween forecasters and emergency management of-*
25 *icials.*

1 “(H) In coordination with the Com-
2 mandant of the Coast Guard and the Adminis-
3 trator of the Federal Emergency Management
4 Agency, evaluating and recommending proce-
5 dures for ports and harbors at risk of tsunami
6 inundation, including review of readiness, re-
7 sponse, and communication strategies, and data
8 sharing policies, to the maximum extent prac-
9 ticable.

10 “(I) Making data gathered under this Act
11 and post-warning analyses conducted by the Na-
12 tional Weather Service or other relevant Admin-
13 istration offices available to the public.

14 “(J) Integrating and modernizing the pro-
15 gram operated under this section with advances
16 in tsunami science to improve performance with-
17 out compromising service.

18 “(3) *FAIL-SAFE WARNING CAPABILITY.*—The tsu-
19 nami warning centers supported or maintained under
20 paragraph (1) shall maintain a fail-safe warning ca-
21 pability and perform back-up duties for each other.

22 “(4) *COORDINATION WITH NATIONAL WEATHER*
23 *SERVICE.*—The Administrator shall coordinate with
24 the forecast offices of the National Weather Service,
25 the centers supported or maintained under paragraph

1 (1), and such program offices of the Administration
2 as the Administrator or the coordinating committee,
3 as established in section 805(d), consider appropriate
4 to ensure that regional and local forecast offices—

5 “(A) have the technical knowledge and ca-
6 pability to disseminate tsunami warnings for the
7 communities they serve;

8 “(B) leverage connections with local emer-
9 gency management officials for optimally dis-
10 seminating tsunami warnings and forecasts; and

11 “(C) implement mass communication tools
12 in effect on the day before the date of the enact-
13 ment of the Tsunami Warning, Education, and
14 Research Act of 2017 used by the National
15 Weather Service on such date and newer mass
16 communication technologies as they are devel-
17 oped as a part of the Weather-Ready Nation pro-
18 gram of the Administration, or otherwise, for the
19 purpose of timely and effective delivery of tsu-
20 nami warnings.

21 “(5) *UNIFORM OPERATING PROCEDURES.*—The
22 Administrator shall—

23 “(A) develop uniform operational proce-
24 dures for the centers supported or maintained
25 under paragraph (1), including the use of soft-

1 *ware applications, checklists, decision support*
2 *tools, and tsunami warning products that have*
3 *been standardized across the program supported*
4 *under this section;*

5 *“(B) ensure that processes and products of*
6 *the warning system operated under subsection*
7 *(c)—*

8 *“(i) reflect industry best practices*
9 *when practicable;*

10 *“(ii) conform to the maximum extent*
11 *practicable with internationally recognized*
12 *standards for information technology; and*

13 *“(iii) conform to the maximum extent*
14 *practicable with other warning products*
15 *and practices of the National Weather Serv-*
16 *ice;*

17 *“(C) ensure that future adjustments to oper-*
18 *ational protocols, processes, and warning prod-*
19 *ucts—*

20 *“(i) are made consistently across the*
21 *warning system operated under subsection*
22 *(c); and*

23 *“(ii) are applied in a uniform manner*
24 *across such warning system;*

1 “(D) establish a systematic method for in-
 2 formation technology product development to im-
 3 prove long-term technology planning efforts; and

4 “(E) disseminate guidelines and metrics for
 5 evaluating and improving tsunami forecast mod-
 6 els.

7 “(6) AVAILABLE RESOURCES.—The Adminis-
 8 trator, through the National Weather Service, shall
 9 ensure that resources are available to fulfill the obli-
 10 gations of this Act. This includes ensuring supercom-
 11 puting resources are available to run, as rapidly as
 12 possible, such computer models as are needed for pur-
 13 poses of the tsunami warning system operated under
 14 subsection (c).”.

15 (e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND
 16 UPGRADES.—Subsection (e) of section 804 (33 U.S.C.
 17 3203(e)) is amended to read as follows:

18 “(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND
 19 UPGRADES.—In carrying out this section, the Adminis-
 20 trator shall—

21 “(1) develop requirements for the equipment used
 22 to forecast tsunami, including—

23 “(A) provisions for multipurpose detection
 24 platforms;

1 “(B) reliability and performance metrics;
2 and

3 “(C) to the maximum extent practicable, re-
4 quirements for the integration of equipment with
5 other United States and global ocean and coastal
6 observation systems, the global Earth observing
7 system of systems, the global seismic networks,
8 and the Advanced National Seismic System;

9 “(2) develop and execute a plan for the transfer
10 of technology from ongoing research conducted as part
11 of the program supported or maintained under sec-
12 tion 6 into the program under this section; and

13 “(3) ensure that the Administration’s oper-
14 ational tsunami detection equipment is properly
15 maintained.”.

16 (f) *FEDERAL COOPERATION*.—Subsection (f) of section
17 804 (33 U.S.C. 3203(f)) is amended to read as follows:

18 “(f) *FEDERAL COOPERATION*.—When deploying and
19 maintaining tsunami detection technologies under the pro-
20 gram under this section, the Administrator shall—

21 “(1) identify which assets of other Federal agen-
22 cies are necessary to support such program; and

23 “(2) work with each agency identified under
24 paragraph (1)—

25 “(A) to acquire the agency’s assistance; and

1 “(B) to prioritize the necessary assets in
2 support of the tsunami forecast and warning
3 program.”.

4 (g) *UNNECESSARY PROVISIONS.*—Section 804 (33
5 *U.S.C. 3203*) is further amended—

6 (1) by striking subsection (g);

7 (2) by striking subsections (i) through (k); and

8 (3) by redesignating subsection (h) as subsection
9 (g).

10 (h) *CONGRESSIONAL NOTIFICATIONS.*—Subsection (g)
11 of section 804 (33 *U.S.C. 3203(g)*), as redesignated by sub-
12 section (g)(3), is amended—

13 (1) by redesignating paragraphs (1) and (2) as
14 subparagraphs (A) and (B), respectively, and moving
15 such subparagraphs 2 ems to the right;

16 (2) in the matter before subparagraph (A), as re-
17 designated by paragraph (2), by striking “The Ad-
18 ministrator” and inserting the following:

19 “(1) *IN GENERAL.*—The Administrator”;

20 (3) in paragraph (1), as redesignated by para-
21 graph (3)—

22 (A) in subparagraph (A), as redesignated
23 by paragraph (2), by striking “and” at the end;

1 (B) in subparagraph (B), as redesignated
2 by paragraph (2), by striking the period at the
3 end and inserting “; and”; and

4 (C) by adding at the end the following:

5 “(C) the occurrence of a significant tsunami
6 warning.”; and

7 (4) by adding at the end the following:

8 “(2) CONTENTS.—In a case in which notice is
9 submitted under paragraph (1) within 30 days of a
10 significant tsunami warning described in subpara-
11 graph (C) of such paragraph, such notice shall in-
12 clude, as appropriate, brief information and analysis
13 of—

14 “(A) the accuracy of the tsunami model
15 used;

16 “(B) the specific deep ocean or other moni-
17 toring equipment that detected the incident, as
18 well as the deep ocean or other monitoring equip-
19 ment that did not detect the incident due to mal-
20 function or other reasons;

21 “(C) the effectiveness of the warning com-
22 munication, including the dissemination of
23 warnings with State, territory, local, and tribal
24 partners in the affected area under the jurisdic-
25 tion of the National Weather Service; and

1 “(D) such other findings as the Adminis-
2 trator considers appropriate.”.

3 **SEC. 505. MODIFICATION OF NATIONAL TSUNAMI HAZARD**
4 **MITIGATION PROGRAM.**

5 (a) *IN GENERAL.*—Section 805(a) (33 U.S.C. 3204(a))
6 is amended to read as follows:

7 “(a) *PROGRAM REQUIRED.*—The Administrator, in co-
8 ordination with the Administrator of the Federal Emer-
9 gency Management Agency and the heads of such other
10 agencies as the Administrator considers relevant, shall con-
11 duct a community-based tsunami hazard mitigation pro-
12 gram to improve tsunami preparedness and resiliency of
13 at-risk areas in the United States and the territories of the
14 United States.”.

15 (b) *NATIONAL TSUNAMI HAZARD MITIGATION PRO-*
16 *GRAM.*—Section 805 (33 U.S.C. 3204) is amended by strik-
17 ing subsections (c) and (d) and inserting the following:

18 “(c) *PROGRAM COMPONENTS.*—The Program con-
19 ducted under subsection (a) shall include the following:

20 “(1) *Technical and financial assistance to coast-*
21 *al States, territories, tribes, and local governments to*
22 *develop and implement activities under this section.*

23 “(2) *Integration of tsunami preparedness and*
24 *mitigation programs into ongoing State-based hazard*
25 *warning, resilience planning, and risk management*

1 *activities, including predisaster planning, emergency*
2 *response, evacuation planning, disaster recovery, haz-*
3 *ard mitigation, and community development and re-*
4 *development planning programs in affected areas.*

5 *“(3) Coordination with other Federal prepared-*
6 *ness and mitigation programs to leverage Federal in-*
7 *vestment, avoid duplication, and maximize effort.*

8 *“(4) Activities to promote the adoption of tsu-*
9 *unami resilience, preparedness, warning, and mitiga-*
10 *tion measures by Federal, State, territorial, tribal,*
11 *and local governments and nongovernmental entities,*
12 *including educational and risk communication pro-*
13 *grams to discourage development in high-risk areas.*

14 *“(5) Activities to support the development of re-*
15 *gional tsunami hazard and risk assessments. Such re-*
16 *gional risk assessments may include the following:*

17 *“(A) The sources, sizes, and other relevant*
18 *historical data of tsunami in the region, includ-*
19 *ing paleotsunami data.*

20 *“(B) Inundation models and maps of crit-*
21 *ical infrastructure and socioeconomic vulner-*
22 *ability in areas subject to tsunami inundation.*

23 *“(C) Maps of evacuation areas and evacu-*
24 *ation routes, including, when appropriate, traffic*

1 *studies that evaluate the viability of evacuation*
2 *routes.*

3 *“(D) Evaluations of the size of populations*
4 *that will require evacuation, including popu-*
5 *lations with special evacuation needs.*

6 *“(E) Evaluations and technical assistance*
7 *for vertical evacuation structure planning for*
8 *communities where models indicate limited or no*
9 *ability for timely evacuation, especially in areas*
10 *at risk of near shore generated tsunami.*

11 *“(F) Evaluation of at-risk ports and har-*
12 *bors.*

13 *“(G) Evaluation of the effect of tsunami*
14 *currents on the foundations of closely-spaced,*
15 *coastal high-rise structures.*

16 *“(6) Activities to promote preparedness in at-*
17 *risk ports and harbors, including the following:*

18 *“(A) Evaluation and recommendation of*
19 *procedures for ports and harbors in the event of*
20 *a distant or near-field tsunami.*

21 *“(B) A review of readiness, response, and*
22 *communication strategies to ensure coordination*
23 *and data sharing with the Coast Guard.*

24 *“(7) Activities to support the development of*
25 *community-based outreach and education programs to*

1 *ensure community readiness and resilience, including*
2 *the following:*

3 “(A) *The development, implementation, and*
4 *assessment of technical training and public edu-*
5 *cation programs, including education programs*
6 *that address unique characteristics of distant*
7 *and near-field tsunami.*

8 “(B) *The development of decision support*
9 *tools.*

10 “(C) *The incorporation of social science re-*
11 *search into community readiness and resilience*
12 *efforts.*

13 “(D) *The development of evidence-based*
14 *education guidelines.*

15 “(8) *Dissemination of guidelines and standards*
16 *for community planning, education, and training*
17 *products, programs, and tools, including—*

18 “(A) *standards for—*

19 “(i) *mapping products;*

20 “(ii) *inundation models; and*

21 “(iii) *effective emergency exercises; and*

22 “(B) *recommended guidance for at-risk port*
23 *and harbor tsunami warning, evacuation, and*
24 *response procedures in coordination with the*

1 *Coast Guard and the Federal Emergency Man-*
2 *agement Agency.*

3 “(d) *AUTHORIZED ACTIVITIES.*—*In addition to activi-*
4 *ties conducted under subsection (c), the program conducted*
5 *under subsection (a) may include the following:*

6 “(1) *Multidisciplinary vulnerability assessment*
7 *research, education, and training to help integrate*
8 *risk management and resilience objectives with com-*
9 *munity development planning and policies.*

10 “(2) *Risk management training for local officials*
11 *and community organizations to enhance under-*
12 *standing and preparedness.*

13 “(3) *In coordination with the Federal Emer-*
14 *gency Management Agency, interagency, Federal,*
15 *State, tribal, and territorial intergovernmental tsu-*
16 *unami response exercise planning and implementation*
17 *in high risk areas.*

18 “(4) *Development of practical applications for*
19 *existing or emerging technologies, such as modeling,*
20 *remote sensing, geospatial technology, engineering,*
21 *and observing systems, including the integration of*
22 *tsunami sensors into Federal and commercial sub-*
23 *marine telecommunication cables if practicable.*

24 “(5) *Risk management, risk assessment, and re-*
25 *silience data and information services, including—*

1 “(A) access to data and products derived
2 from observing and detection systems; and

3 “(B) development and maintenance of new
4 integrated data products to support risk manage-
5 ment, risk assessment, and resilience programs.

6 “(6) Risk notification systems that coordinate
7 with and build upon existing systems and actively en-
8 gage decisionmakers, State, local, tribal, and terri-
9 torial governments and agencies, business commu-
10 nities, nongovernmental organizations, and the
11 media.

12 “(e) NO PREEMPTION WITH RESPECT TO DESIGNA-
13 TION OF AT-RISK AREAS.—The establishment of national
14 standards for inundation models under this section shall
15 not prevent States, territories, tribes, and local governments
16 from designating additional areas as being at risk based
17 on knowledge of local conditions.

18 “(f) NO NEW REGULATORY AUTHORITY.—Nothing in
19 this Act may be construed as establishing new regulatory
20 authority for any Federal agency.”.

21 “(c) REPORT ON ACCREDITATION OF TSUNAMIREADY
22 PROGRAM.—Not later than 180 days after the date of enact-
23 ment of this Act, the Administrator of the National Oceanic
24 and Atmospheric Administration shall submit to the Com-
25 mittee on Commerce, Science, and Transportation of the

1 *Senate and the Committee on Science, Space, and Tech-*
 2 *nology of the House of Representatives a report on which*
 3 *authorities and activities would be needed to have the*
 4 *TsunamiReady program of the National Weather Service*
 5 *accredited by the Emergency Management Accreditation*
 6 *Program.*

7 **SEC. 506. MODIFICATION OF TSUNAMI RESEARCH PRO-**
 8 **GRAM.**

9 *Section 806 (33 U.S.C. 3205) is amended—*

10 *(1) in the matter before paragraph (1), by strik-*
 11 *ing “The Administrator shall” and all that follows*
 12 *through “establish or maintain” and inserting the fol-*
 13 *lowing:*

14 *“(a) IN GENERAL.—The Administrator shall, in con-*
 15 *sultation with such other Federal agencies, State, tribal,*
 16 *and territorial governments, and academic institutions as*
 17 *the Administrator considers appropriate, the coordinating*
 18 *committee under section 805(d), and the panel under sec-*
 19 *tion 808(a), support or maintain”;*

20 *(2) in subsection (a), as designated by para-*
 21 *graph (1), by striking “and assessment for tsunami*
 22 *tracking and numerical forecast modeling. Such re-*
 23 *search program shall—” and inserting the following:*
 24 *“assessment for tsunami tracking and numerical fore-*
 25 *cast modeling, and standards development.*

1 “(b) *RESPONSIBILITIES.*—*The research program sup-*
2 *ported or maintained under subsection (a) shall—*”; and

3 (3) *in subsection (b), as designated by paragraph*
4 *(2)—*

5 (A) *by amending paragraph (1) to read as*
6 *follows:*

7 “(1) *consider other appropriate and cost effective*
8 *solutions to mitigate the impact of tsunami, includ-*
9 *ing the improvement of near-field and distant tsu-*
10 *nami detection and forecasting capabilities, which*
11 *may include use of a new generation of the Deep-*
12 *ocean Assessment and Reporting of Tsunamis array,*
13 *integration of tsunami sensors into commercial and*
14 *Federal telecommunications cables, and other real-*
15 *time tsunami monitoring systems and supercomputer*
16 *capacity of the Administration to develop a rapid*
17 *tsunami forecast for all United States coastlines;*”;

18 (B) *in paragraph (3)—*

19 (i) *by striking “include” and inserting*
20 *“conduct”; and*

21 (ii) *by striking “and” at the end;*

22 (C) *by redesignating paragraph (4) as*
23 *paragraph (5);*

24 (D) *by inserting after paragraph (3) the fol-*
25 *lowing:*

1 “(4) develop the technical basis for validation of
2 tsunami maps, numerical tsunami models, digital ele-
3 vation models, and forecasts; and”; and

4 (E) in paragraph (5), as redesignated by
5 subparagraph (C), by striking “to the scientific
6 community” and inserting “to the public and
7 the scientific community”.

8 **SEC. 507. GLOBAL TSUNAMI WARNING AND MITIGATION**
9 **NETWORK.**

10 Section 807 (33 U.S.C. 3206) is amended—

11 (1) by amending subsection (a) to read as fol-
12 lows:

13 “(a) *SUPPORT FOR DEVELOPMENT OF AN INTER-*
14 *NATIONAL TSUNAMI WARNING SYSTEM.—The Adminis-*
15 *trator shall, in coordination with the Secretary of State and*
16 *in consultation with such other agencies as the Adminis-*
17 *trator considers relevant, provide technical assistance, oper-*
18 *ational support, and training to the Intergovernmental*
19 *Oceanographic Commission of the United Nations Edu-*
20 *cational, Scientific, and Cultural Organization, the World*
21 *Meteorological Organization of the United Nations, and*
22 *such other international entities as the Administrator con-*
23 *siders appropriate, as part of the international efforts to*
24 *develop a fully functional global tsunami forecast and*

1 *warning system comprised of regional tsunami warning*
 2 *networks.”;*

3 (2) *in subsection (b), by striking “shall” each*
 4 *place it appears and inserting “may”; and*

5 (3) *in subsection (c)—*

6 (A) *in paragraph (1), by striking “estab-*
 7 *lishing” and inserting “supporting”; and*

8 (B) *in paragraph (2)—*

9 (i) *by striking “establish” and insert-*
 10 *ing “support”; and*

11 (ii) *by striking “establishing” and in-*
 12 *serting “supporting”.*

13 **SEC. 508. TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY**

14 **PANEL.**

15 (a) *IN GENERAL.—The Act is further amended—*

16 (1) *by redesignating section 808 (33 U.S.C.*
 17 *3207) as section 809; and*

18 (2) *by inserting after section 807 (33 U.S.C.*
 19 *3206) the following:*

20 **“SEC. 808. TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY**

21 **PANEL.**

22 “(a) *DESIGNATION.—The Administrator shall des-*
 23 *ignate an existing working group within the Science Advi-*
 24 *sory Board of the Administration to serve as the Tsunami*
 25 *Science and Technology Advisory Panel to provide advice*

1 *to the Administrator on matters regarding tsunami science,*
2 *technology, and regional preparedness.*

3 “(b) *MEMBERSHIP.*—

4 “(1) *COMPOSITION.*—*The Panel shall be com-*
5 *posed of no fewer than 7 members selected by the Ad-*
6 *ministrator from among individuals from academia*
7 *or State agencies who have academic or practical ex-*
8 *pertise in physical sciences, social sciences, informa-*
9 *tion technology, coastal resilience, emergency manage-*
10 *ment, or such other disciplines as the Administrator*
11 *considers appropriate.*

12 “(2) *FEDERAL EMPLOYMENT.*—*No member of the*
13 *Panel may be a Federal employee.*

14 “(c) *RESPONSIBILITIES.*—*Not less frequently than*
15 *once every 4 years, the Panel shall—*

16 “(1) *review the activities of the Administration,*
17 *and other Federal activities as appropriate, relating*
18 *to tsunami research, detection, forecasting, warning,*
19 *mitigation, resiliency, and preparation; and*

20 “(2) *submit to the Administrator and such others*
21 *as the Administrator considers appropriate—*

22 “(A) *the findings of the working group with*
23 *respect to the most recent review conducted under*
24 *paragraph (1); and*

1 “(B) *such recommendations for legislative*
 2 *or administrative action as the working group*
 3 *considers appropriate to improve Federal tsu-*
 4 *nami research, detection, forecasting, warning,*
 5 *mitigation, resiliency, and preparation.*

6 “(d) *REPORTS TO CONGRESS.—Not less frequently*
 7 *than once every 4 years, the Administrator shall submit to*
 8 *the Committee on Commerce, Science, and Transportation*
 9 *of the Senate, and the Committee on Science, Space, and*
 10 *Technology of the House of Representatives a report on the*
 11 *findings and recommendations received by the Adminis-*
 12 *trator under subsection (c)(2).”.*

13 “(b) *TABLE OF CONTENTS AMENDMENT.—The table of*
 14 *contents in section 1(b) of the Magnuson-Stevens Fishery*
 15 *Conservation and Management Reauthorization Act of 2006*
 16 *(Public Law 109–479; 120 Stat. 3575) is amended by strik-*
 17 *ing the item relating to section 808 and inserting the fol-*
 18 *lowing:*

 “Sec. 808. *Tsunami Science and Technology Advisory Panel.*

 “Sec. 809. *Authorization of appropriations.”.*

19 **SEC. 509. REPORTS.**

20 “(a) *REPORT ON IMPLEMENTATION OF TSUNAMI WARN-*
 21 *ING AND EDUCATION ACT.—*

22 “(1) *IN GENERAL.—Not later than 1 year after*
 23 *the date of the enactment of this Act, the Adminis-*
 24 *trator of the National Oceanic and Atmospheric Ad-*

1 *ministration shall submit to Congress a report on the*
2 *implementation of the Tsunami Warning and Edu-*
3 *cation Act enacted as title VIII of the Magnuson-Ste-*
4 *vens Fishery Conservation and Management Reau-*
5 *thorization Act of 2006 (Public Law 109–479; 33*
6 *U.S.C. 3201 et seq.), as amended by this Act.*

7 (2) *ELEMENTS.—The report required by para-*
8 *graph (1) shall include the following:*

9 (A) *A detailed description of the progress*
10 *made in implementing sections 804(d)(6),*
11 *805(b), and 806(b)(4) of the Tsunami Warning*
12 *and Education Act the Magnuson-Stevens Fish-*
13 *ery Conservation and Management Reauthoriza-*
14 *tion Act of 2006 (Public Law 109–479; 33*
15 *U.S.C. 3201 et seq.).*

16 (B) *A description of the ways that tsunami*
17 *warnings and warning products issued by the*
18 *Tsunami Forecasting and Warning Program es-*
19 *tablished under section 804 of the Tsunami*
20 *Warning and Education Act (33 U.S.C. 3203),*
21 *as amended by this Act, may be standardized*
22 *and streamlined with warnings and warning*
23 *products for hurricanes, coastal storms, and*
24 *other coastal flooding events.*

1 **(b) REPORT ON NATIONAL EFFORTS THAT SUPPORT**
2 **RAPID RESPONSE FOLLOWING NEAR-SHORE TSUNAMI**
3 **EVENTS.—**

4 **(1) IN GENERAL.—***Not later than 1 year after*
5 *the date of the enactment of this Act, the Adminis-*
6 *trator and the Secretary of Homeland Security shall*
7 *jointly, in coordination with the Director of the*
8 *United States Geological Survey, Administrator of the*
9 *Federal Emergency Management Agency, the Chief of*
10 *the National Guard Bureau, and the heads of such*
11 *other Federal agencies as the Administrator considers*
12 *appropriate, submit to the appropriate committees of*
13 *Congress a report on the national efforts in effect on*
14 *the day before the date of the enactment of this Act*
15 *that support and facilitate rapid emergency response*
16 *following a domestic near-shore tsunami event to bet-*
17 *ter understand domestic effects of earthquake derived*
18 *tsunami on people, infrastructure, and communities*
19 *in the United States.*

20 **(2) ELEMENTS.—***The report required by para-*
21 *graph (1) shall include the following:*

22 **(A)** *A description of scientific or other*
23 *measurements collected on the day before the date*
24 *of the enactment of this Act to quickly identify*

1 *and quantify lost or degraded infrastructure or*
2 *terrestrial formations.*

3 *(B) A description of scientific or other*
4 *measurements that would be necessary to collect*
5 *to quickly identify and quantify lost or degraded*
6 *infrastructure or terrestrial formations.*

7 *(C) Identification and evaluation of Fed-*
8 *eral, State, local, tribal, territorial, and military*
9 *first responder and search and rescue operation*
10 *centers, bases, and other facilities as well as*
11 *other critical response assets and infrastructure,*
12 *including search and rescue aircraft, located*
13 *within near-shore and distant tsunami inunda-*
14 *tion areas on the day before the date of the en-*
15 *actment of this Act.*

16 *(D) An evaluation of near-shore tsunami re-*
17 *sponse plans in areas described in subparagraph*
18 *(C) in effect on the day before the date of the en-*
19 *actment of this Act, and how those response*
20 *plans would be affected by the loss of search and*
21 *rescue and first responder infrastructure de-*
22 *scribed in such subparagraph.*

23 *(E) A description of redevelopment plans*
24 *and reports in effect on the day before the date*
25 *of the enactment of this Act for communities in*

1 *areas that are at high-risk for near-shore tsu-*
 2 *nami, as well identification of States or commu-*
 3 *nities that do not have redevelopment plans.*

4 *(F) Recommendations to enhance near-shore*
 5 *tsunami preparedness and response plans, in-*
 6 *cluding recommended responder exercises,*
 7 *predisaster planning, and mitigation needs.*

8 *(G) Such other data and analysis informa-*
 9 *tion as the Administrator and the Secretary of*
 10 *Homeland Security consider appropriate.*

11 *(3) APPROPRIATE COMMITTEES OF CONGRESS.—*
 12 *In this subsection, the term “appropriate committees*
 13 *of Congress” means—*

14 *(A) the Committee on Commerce, Science,*
 15 *and Transportation and the Committee on*
 16 *Homeland Security and Governmental Affairs of*
 17 *the Senate; and*

18 *(B) the Committee on Science, Space, and*
 19 *Technology, the Committee on Homeland Secu-*
 20 *rity, and the Committee on Transportation and*
 21 *Infrastructure of the House of Representatives.*

22 **SEC. 510. AUTHORIZATION OF APPROPRIATIONS.**

23 *Section 809 of the Act, as redesignated by section*
 24 *__08(a)(1) of this Act, is amended—*

1 (1) in paragraph (4)(B), by striking “and” at
2 the end;

3 (2) in paragraph (5)(B), by striking the period
4 at the end and inserting “; and”; and

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

6 “(6) \$25,800,000 for each of fiscal years 2016
7 through 2021, of which—

8 “(A) not less than 27 percent of the amount
9 appropriated for each fiscal year shall be for ac-
10 tivities conducted at the State level under the
11 tsunami hazard mitigation program under sec-
12 tion 805; and

13 “(B) not less than 8 percent of the amount
14 appropriated shall be for the tsunami research
15 program under section 806.”.

16 **SEC. 511. OUTREACH RESPONSIBILITIES.**

17 *The Administrator of the National Oceanic and At-*
18 *mospheric Administration, in coordination with State and*
19 *local emergency managers, shall develop and carry out for-*
20 *mal outreach activities to improve tsunami education and*
21 *awareness and foster the development of resilient commu-*
22 *nities. Outreach activities may include—*

23 (1) the development of outreach plans to ensure
24 the close integration of tsunami warning centers sup-
25 ported or maintained under section 804(d) of the Tsu-

1 *nam*i Warning and Education Act (33 U.S.C.
 2 3203(d)), as amended by this Act, with local Weather
 3 Forecast Offices of the National Weather Service and
 4 emergency managers;

5 (2) working with appropriate local Weather
 6 Forecast Offices to ensure they have the technical
 7 knowledge and capability to disseminate tsunami
 8 warnings to the communities they serve; and

9 (3) evaluating the effectiveness of warnings and
 10 of coordination with local Weather Forecast Offices
 11 after significant tsunami events.

12 **SEC. 512. REPEAL OF DUPLICATE PROVISIONS OF LAW.**

13 (a) *REPEAL*.—The Tsunami Warning and Education
 14 Act enacted by Public Law 109–424 (120 Stat. 2902) is
 15 repealed.

16 (b) *CONSTRUCTION*.—Nothing in this section may be
 17 construed to repeal, or affect in any way, the Tsunami
 18 Warning and Education Act enacted as title VIII of the
 19 Magnuson-Stevens Fishery Conservation and Management
 20 Reauthorization Act of 2006 (Public Law 109–479; 33
 21 U.S.C. 3201 *et seq.*).

Attest:

Secretary.

115TH CONGRESS
1ST SESSION

H.R. 353

AMENDMENT