

## Union Calendar No. 247

118TH CONGRESS  
1ST SESSION

# H. R. 6093

[Report No. 118-306]

To improve the National Oceanic and Atmospheric Administration's weather research, support improvements in weather forecasting and prediction, expand commercial opportunities for the provision of weather data, and for other purposes.

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### IN THE HOUSE OF REPRESENTATIVES

OCTOBER 26, 2023

Mr. LUCAS (for himself, Ms. LOFGREN, Mr. MILLER of Ohio, Mr. WEBER of Texas, Mr. BABIN, Mr. BAIRD, Mr. MIKE GARCIA of California, Mrs. BICE, Mr. OBERNOLTE, Mr. FLEISCHMANN, Ms. TENNEY, Mr. MCCORMICK, Mr. COLLINS, and Mr. KEAN of New Jersey) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

DECEMBER 11, 2023

Additional sponsors: Mr. FEENSTRA, Mr. MORAN, Mr. CRAWFORD, Ms. BONAMICI, Mrs. FOUSHEE, Ms. ROSS, Mr. JACKSON of North Carolina, Ms. STEVENS, Ms. LEE of Pennsylvania, Mr. SORENSEN, Mr. ISSA, Mrs. SYKES, Ms. CARAVEO, Ms. SLOTKIN, Ms. MCCLELLAN, and Mr. FROST

DECEMBER 11, 2023

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in *italic*]

[For text of introduced bill, see copy of bill as introduced on October 26, 2026]

# **A BILL**

To improve the National Oceanic and Atmospheric Administration's weather research, support improvements in weather forecasting and prediction, expand commercial opportunities for the provision of weather data, and for other purposes.

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

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

4 (a) *SHORT TITLE.*—*This Act may be cited as the*  
 5 *“Weather Research and Forecasting Innovation Reauthor-*  
 6 *ization Act of 2023” or the “Weather Act Reauthorization*  
 7 *Act of 2023”.*

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

*Sec. 1. Short title; table of contents.*

*Sec. 2. Definitions.*

**TITLE I—REAUTHORIZATION OF THE WEATHER RESEARCH AND  
 FORECASTING INNOVATION ACT OF 2017**

*Sec. 101. Public safety priority.*

*Sec. 102. United States weather research and forecasting.*

*Sec. 103. Verification of the Origins of Rotation in Tornadoes Experiment (VOR-*  
*TEX).*

*Sec. 104. Hurricane forecast improvement program.*

*Sec. 105. Tsunami Warning and Education Act reauthorization.*

*Sec. 106. Observing system planning.*

*Sec. 107. Observing system simulation experiments.*

*Sec. 108. Computing resources prioritization.*

*Sec. 109. Earth prediction innovation center.*

*Sec. 110. Satellite architecture planning.*

*Sec. 111. Improving uncrewed activities.*

*Sec. 112. Interagency Council for Advancing Meteorological Services.*

*Sec. 113. Ocean observations.*

*Sec. 114. Consolidation of reports.*

*Sec. 115. National Landslide Hazards Reduction Program.*

*Sec. 116. Amendments to the Harmful Algal Bloom and Hypoxia Research and*  
*Control Act of 1998.*

**TITLE II—ENHANCING FEDERAL WEATHER FORECASTING AND  
 INNOVATION**

*Sec. 201. Weather innovation for the next generation.*

*Sec. 202. Next generation radar.*

*Sec. 203. Data voids in highly vulnerable areas of the United States.*

*Sec. 204. Atmospheric rivers forecast improvement program.*

*Sec. 205. Coastal flooding and storm surge forecast improvement program.*

*Sec. 206. Aviation weather and data innovation.*

*Sec. 207. NESDIS joint venture partnership transition program.*

*Sec. 208. Advanced weather interactive processing system.*

*Sec. 209. Reanalysis and reforecasting.*  
*Sec. 210. National Weather Service workforce.*

**TITLE III—COMMERCIAL WEATHER AND ENVIRONMENTAL  
OBSERVATIONS**

*Sec. 301. Commercial Data Program.*  
*Sec. 302. Commercial Data Pilot Program.*  
*Sec. 303. Contracting authority and avoidance of duplication.*  
*Sec. 304. Data assimilation, management, and sharing practices.*  
*Sec. 305. Clerical amendment.*

**TITLE IV—COMMUNICATING WEATHER TO THE PUBLIC**

*Sec. 401. Definitions.*  
*Sec. 402. Hazardous weather or water event risk communication.*  
*Sec. 403. Hazard communication research and engagement.*  
*Sec. 404. National Weather Service communications improvement.*  
*Sec. 405. NOAA Weather Radio modernization.*  
*Sec. 406. Post-storm surveys and assessments.*  
*Sec. 407. Government Accountability Office report on alert dissemination for hazardous weather or water events.*  
*Sec. 408. Data collection management and protection.*

**TITLE V—IMPROVING WEATHER INFORMATION FOR AGRICULTURE  
AND WATER MANAGEMENT**

*Sec. 501. Weather and climate information in agriculture and water management.*  
*Sec. 502. National Integrated Drought Information System.*  
*Sec. 503. National Mesonet Program.*  
*Sec. 504. National Coordinated Soil Moisture Monitoring Network.*  
*Sec. 505. National water center.*  
*Sec. 506. Satellite transfers report.*  
*Sec. 507. Precipitation forecast improvement program.*

**1 SEC. 2. DEFINITIONS.**

2       (a) *IN GENERAL.*—*In this Act, the terms “seasonal”,*  
3 *“State”, “subseasonal”, “Under Secretary”, “weather enter-*  
4 *prise”, “weather data”, and “weather industry” have the*  
5 *meanings given such terms in section 2 of the Weather Re-*  
6 *search and Forecasting Innovation Act of 2017 (15 U.S.C.*  
7 *8501).*

8       (b) *WEATHER DATA DEFINED.*—*Section 2 of the*  
9 *Weather Research and Forecasting Innovation Act of 2017*  
10 *(15 U.S.C. 8501) is amended—*

1           (1) by redesignating paragraph (5) as para-  
2           graph (6); and

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

5           “(5) *WEATHER DATA*.—The term ‘weather data’  
6           means information used to track and predict weather  
7           conditions and patterns, including forecasts, observa-  
8           tions, and derivative products from such informa-  
9           tion.”.

10 **TITLE I—REAUTHORIZATION OF**  
11 **THE WEATHER RESEARCH**  
12 **AND FORECASTING INNOVA-**  
13 **TION ACT OF 2017**

14 **SEC. 101. PUBLIC SAFETY PRIORITY.**

15           Section 101 of the Weather Research and Forecasting  
16 Innovation Act of 2017 (15 U.S.C. 8511) is amended by  
17 adding at the end the following new sentence: “The Under  
18 Secretary shall ensure the National Oceanic and Atmos-  
19 pheric Administration remains focused on providing accu-  
20 rate and timely weather forecasts that protect lives and  
21 property and enhance the national economy by dissemi-  
22 nating to the public and core partners through nimble, flexi-  
23 ble, and mobile methods critical weather information and  
24 impact-based decision support services.”.

1 **SEC. 102. UNITED STATES WEATHER RESEARCH AND FORE-**  
2 **CASTING.**

3 *Section 110 of the Weather Research and Forecasting*  
4 *Innovation Act of 2017 (15 U.S.C. 8519) is amended to*  
5 *read as follows:*

6 **“SEC. 110. AUTHORIZATION OF APPROPRIATIONS.**

7 *“(a) AUTHORIZATION OF APPROPRIATIONS.—There*  
8 *are authorized to be appropriated to the Office of Oceanic*  
9 *and Atmospheric Research to carry out this title the fol-*  
10 *lowing:*

11 *“(1) \$155,000,000 for fiscal year 2024, of*  
12 *which—*

13 *“(A) \$90,000,000 is authorized for weather*  
14 *laboratories and cooperative institutes;*

15 *“(B) \$30,000,000 is authorized for the*  
16 *United States Weather Research Program;*

17 *“(C) \$20,000,000 is authorized for tornado,*  
18 *severe storm, and next generation radar research;*  
19 *and*

20 *“(D) \$15,000,000 is authorized for the joint*  
21 *technology transfer initiative described in section*  
22 *102(b)(4) of this title.*

23 *“(2) \$156,550,000 for fiscal year 2025, of*  
24 *which—*

25 *“(A) \$90,900,000 is authorized for weather*  
26 *laboratories and cooperative institutes;*

1           “(B) \$30,300,000 is authorized for the  
2           United States Weather Research Program;

3           “(C) \$20,200,000 is authorized for tornado,  
4           severe storm, and next generation radar research;  
5           and

6           “(D) \$15,150,000 is authorized for the joint  
7           technology transfer initiative described in section  
8           102(b)(4) of this title.

9           “(3) \$158,116,000 for fiscal year 2026, of  
10          which—

11           “(A) \$91,809,000 is authorized for weather  
12           laboratories and cooperative institutes;

13           “(B) \$30,603,000 is authorized for the  
14           United States Weather Research Program;

15           “(C) \$20,402,000 is authorized for tornado,  
16           severe storm, and next generation radar research;  
17           and

18           “(D) \$15,302,000 is authorized for the joint  
19           technology transfer initiative described in section  
20           102(b)(4) of this title.

21           “(4) \$159,697,000 for fiscal year 2027, of  
22          which—

23           “(A) \$92,727,000 is authorized for weather  
24           laboratories and cooperative institutes;

1           “(B) \$30,909,000 is authorized for the  
2           United States Weather Research Program;

3           “(C) \$20,606,000 is authorized for tornado,  
4           severe storm, and next generation radar research;  
5           and

6           “(D) \$15,455,000 is authorized for the joint  
7           technology transfer initiative described in section  
8           102(b)(4) of this title.

9           “(5) \$161,294,000 for fiscal year 2028, of  
10          which—

11           “(A) \$93,654,000 is authorized for weather  
12           laboratories and cooperative institutes;

13           “(B) \$31,218,000 is authorized for the  
14           United States Weather Research Program;

15           “(C) \$20,812,000 is authorized for tornado,  
16           severe storm, and next generation radar research;  
17           and

18           “(D) \$15,609,000 is authorized for the joint  
19           technology transfer initiative described in section  
20           8512(b)(4) of this title.

21          “(b) *LIMITATION.*—No additional funds are authorized  
22          to carry out this title or the amendments made by this  
23          title.”.

1 **SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN**  
2 **TORNADOES EXPERIMENT (VORTEX).**

3 (a) *IN GENERAL.*—Section 103 of the Weather Re-  
4 search and Forecasting Innovation Act of 2017 (15 U.S.C.  
5 8513) is amended to read as follows:

6 **“SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN**  
7 **TORNADOES EXPERIMENT (VORTEX).**

8 “(a) *IN GENERAL.*—The Under Secretary, in collabo-  
9 ration with the United States weather industry and aca-  
10 demic partners, shall maintain a program for rapidly im-  
11 proving tornado forecasts, predictions, and warnings, in-  
12 cluding forecaster training in radar interpretation and in-  
13 formation integration from new sources.

14 “(b) *GOAL.*—The goal of the program under subsection  
15 (a) shall be to develop and extend accurate tornado fore-  
16 casts, predictions, and warnings in order to reduce the loss  
17 of life or property related to tornadoes, with a focus on the  
18 following:

19 “(1) *Improving the effectiveness and timeliness of*  
20 *tornado forecasts, predictions, and warnings.*

21 “(2) *Optimizing lead time and providing action-*  
22 *able information beyond one hour in advance.*

23 “(3) *Transitioning from warn-on-detection to*  
24 *warn-on-forecast.*

25 “(c) *INNOVATIVE OBSERVATIONS.*—The Under Sec-  
26 retary shall ensure the program under subsection (a) peri-

1 *odically examines, tests, and evaluates the value of incor-*  
2 *porating innovative observations, such as novel sensor tech-*  
3 *nologies, observation tools or networks, crewed or uncrewed*  
4 *systems, and hosted instruments on commercial aircrafts,*  
5 *vessels, and satellites, with respect to the improvement of*  
6 *tornado forecasts, predictions, and warnings.*

7       “(d) *ACTIVITIES.—The Under Secretary shall award*  
8 *grants for research, including relating to the following:*

9               “(1) *Implementing key goals and achieving pro-*  
10 *gram milestones to the maximum extent practicable*  
11 *as outlined by the National Oceanic and Atmospheric*  
12 *Administration’s 2019 report, ‘Tornado Warning Im-*  
13 *provement and Extension Program Plan’.*

14               “(2) *In coordination with the National Science*  
15 *and Technology Council’s Social and Behavioral*  
16 *Sciences Subcommittee, improving the social, behav-*  
17 *ioral, risk, communication, and economic sciences re-*  
18 *garding vulnerabilities, risk communication, and de-*  
19 *livery of information critical for reducing the loss of*  
20 *life or property related to tornadoes.*

21               “(3) *Improving the physical sciences, computer*  
22 *modeling, and tools related to tornado formation, the*  
23 *impacts of tornadoes on the built and natural envi-*  
24 *ronment, and the interaction of tornadoes and hurri-*  
25 *canes.*

1       “(e) *WARNINGS.—In carrying out subsection (a), the*  
2 *Under Secretary, in coordination with the program estab-*  
3 *lished under section 406, shall—*

4               “(1) *conduct and transition to operations the re-*  
5 *search necessary to develop and deploy probabilistic*  
6 *weather forecast guidance technology for tornadoes*  
7 *and related weather phenomena;*

8               “(2) *incorporate into tornado modeling and fore-*  
9 *casting, as appropriate, social, behavioral, risk, com-*  
10 *munication, and economic sciences;*

11              “(3) *enhance workforce training on radar inter-*  
12 *pretation and use of tornado warning systems; and*

13              “(4) *expand computational resources to support*  
14 *higher-resolution modeling to advance the capability*  
15 *for warn-on-forecast.*

16       “(f) *TORNADO RATING SYSTEM.—The Under Sec-*  
17 *retary, in collaboration with local communities and emer-*  
18 *gency managers, shall—*

19              “(1) *evaluate the system used as of the date of*  
20 *the enactment of this section to rate the severity of*  
21 *tornadoes;*

22              “(2) *determine whether updates to such system*  
23 *are required to ensure such ratings accurately reflect*  
24 *the severity of tornados; and*

1           “(3) if determined necessary, update such sys-  
2       tem.

3           “(g) ANNUAL BUDGET.—The Under Secretary shall,  
4 not less frequently than annually, submit to Congress a pro-  
5 posed budget corresponding with carrying out this section.”.

6           (b) CLERICAL AMENDMENT.—The table of contents in  
7 section 1(b) of the Weather Research and Forecasting Inno-  
8 vation Act of 2017 is amended by amending the item relat-  
9 ing to section 103 to read as follows:

          “Sec. 103. Verification of the Origins of Rotation in Tornadoes Experiment  
          (VORTEX).”.

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

11       Section 104 of the Weather Research and Forecasting  
12 Innovation Act of 2017 (15 U.S.C. 8514) is amended to  
13 read as follows:

14 **“SEC. 104. HURRICANE FORECAST IMPROVEMENT PRO-**  
15 **GRAM.**

16       “(a) IN GENERAL.—The Under Secretary, in collabo-  
17 ration with the United States weather industry and aca-  
18 demic partners, shall maintain a program to improve hur-  
19 ricane forecasting, predictions, and warnings.

20       “(b) GOAL.—The goal of the program under subsection  
21 (a) shall be to develop and extend accurate hurricane fore-  
22 casts, predictions, and warnings in order to reduce the loss  
23 of life or property related to hurricanes, with a focus on  
24 the following:

1           “(1) *Improving the understanding and pre-*  
2           *diction of rapid intensity change and projected path*  
3           *of hurricanes, including probabilistic methods for*  
4           *hurricane hazard mapping.*

5           “(2) *Improving the forecast and impact-based*  
6           *communication of inland flooding, compound flood-*  
7           *ing, and storm surges from hurricanes, in coordina-*  
8           *tion with the program established under section 205*  
9           *of the Weather Act Reauthorization Act of 2023.*

10           “(3) *Incorporating social, behavioral, risk, com-*  
11           *munication, and economic sciences to clearly inform*  
12           *response to prevent the loss of life or property, such*  
13           *as evacuation or shelter in place.*

14           “(4) *Evaluating and incorporating, as appro-*  
15           *priate, innovative observations, such as novel sensor*  
16           *technologies, observation tools or networks, crewed or*  
17           *uncrewed systems, and hosted instruments on com-*  
18           *mmercial aircrafts, vessels, and satellites.*

19           “(c) *ACTIVITIES.—The Under Secretary shall award*  
20           *grants for research, including relating to the following:*

21           “(1) *Implementing key strategies and following*  
22           *priorities and objectives outlined by the National Oce-*  
23           *anic and Atmospheric Administration’s 2019 report*  
24           *‘Hurricane Forecast Improvement Program’.*

1           “(2) *In coordination with the National Science*  
2           *and Technology Council’s Social and Behavioral*  
3           *Sciences Subcommittee and other relevant interagency*  
4           *committees, improving the social, behavioral, risk,*  
5           *communications, and economic sciences related to*  
6           *vulnerabilities, risk communication, and delivery of*  
7           *information critical for reducing the loss of life or*  
8           *property related to hurricanes.*

9           “(3) *Improving the physical sciences, operational*  
10          *modeling, and tools related to hurricane formation,*  
11          *the impacts of wind and water-based hurricane haz-*  
12          *ards on the built and natural environment, and the*  
13          *interaction of hurricanes and tornadoes.*

14          “(d) *WARNINGS.—In carrying out subsection (a), the*  
15          *Under Secretary, in coordination with the program estab-*  
16          *lished under section 406, shall—*

17                 “(1) *conduct and transition to operations the re-*  
18                 *search necessary to develop and deploy probabilistic*  
19                 *weather forecast guidance technology relating to hur-*  
20                 *ricanes and related weather phenomena;*

21                 “(2) *incorporate into hurricane modeling and*  
22                 *forecasting, as appropriate, social, behavioral, risk,*  
23                 *communication, and economic sciences research; and*

1           “(3) *expand computational resources to support*  
2           *and improve higher-resolution operational modeling*  
3           *of hurricanes and related weather phenomena.*

4           “(e) *ANNUAL BUDGET.—The Under Secretary shall,*  
5           *not less frequently than annually, submit to Congress a pro-*  
6           *posed budget corresponding with carrying out this section.”.*

7           **SEC. 105. TSUNAMI WARNING AND EDUCATION ACT REAU-**  
8           **THORIZATION.**

9           (a) *TITLE HEADING.—The Tsunami Warning and*  
10          *Education Act (enacted as title VIII of the Magnuson-Ste-*  
11          *vens Fishery Conservation and Management Reauthoriza-*  
12          *tion Act of 2006 (Public Law 109–479)) is amended in the*  
13          *title heading, by inserting “**RESEARCH,**” after*  
14          *“**WARNING,**”.*

15          (b) *PURPOSES.—Section 803 of the Tsunami Warning*  
16          *and Education Act (33 U.S.C. 3202) is amended—*

17                 (1) *in paragraph (2), by inserting “timeliness*  
18                 *and” before “accuracy”;*

19                 (2) *in paragraph (7), by striking “and” after the*  
20                 *semicolon;*

21                 (3) *in paragraph (8), by striking the period and*  
22                 *inserting “; and”; and*

23                 (4) *by adding at the end the following new para-*  
24                 *graph:*

1           “(9) to ensure data and metadata are managed,  
2           archived, and made available for operations, research,  
3           education, and mitigation activities in accordance  
4           with section 305 of the Weather Research and Fore-  
5           casting Innovation Act of 2017.”.

6           (c) *TSUNAMI FORECASTING AND WARNING PRO-*  
7 *GRAM.*—Section 804 of the *Tsunami Warning and Edu-*  
8 *cation Act (33 U.S.C. 3203)* is amended—

9           (1) in subsection (b)—

10                   (A) in paragraph (4), by inserting “, using  
11                   industry and scientific best practices,” after  
12                   “operational condition”;

13                   (B) in paragraph (5)—

14                           (i) in subparagraph (C), by striking  
15                           “global seismic network” and inserting  
16                           “Global Seismic Network”;

17                           (ii) by redesignating subparagraphs  
18                           (D), (E), (F), and (G), as subparagraphs  
19                           (E), (F), (G), and (H), respectively; and

20                           (iii) by inserting after subparagraph  
21                           (C) the following new subparagraph:

22                                   “(D) the global navigation satellite system  
23                                   (GNSS) network;”;

24                   (C) by amending paragraph (6) to read as  
25                   follows:

1           “(6) ensure data quality and management sys-  
2           tems, support data and metadata access and  
3           archiving, and support the requirements of the pro-  
4           gram pursuant to the Foundations for Evidence-  
5           Based Policymaking Act of 2018 (Public Law 115-  
6           435) and chapter 31 of title 44, United States Code;”;

7                       (D) in paragraph (7)—

8                               (i) by amending the matter preceding  
9                               subparagraph (A) to read as follows: “in-  
10                              clude a cooperative effort among the Admin-  
11                              istration, the United States Geological Sur-  
12                              vey (USGS), the National Aeronautics and  
13                              Space Administration (NASA), and the Na-  
14                              tional Science Foundation (NSF) under  
15                              which the Director of USGS, the Director of  
16                              the NSF, and the Administrator of NASA  
17                              shall—”;

18                             (ii) in subparagraph (A), by striking  
19                             “and” at the end; and

20                             (iii) by adding at the end the following  
21                             new subparagraphs:

22                             “(C) provide reliable and real-time support  
23                             for the GNSS network data streams from NSF,  
24                             NASA, and USGS maintained networks, and

1 supplement instrumentation coverage for rapid  
2 earthquake assessment;

3 “(D) assess the data and information relat-  
4 ing to warning systems of collaborating agencies  
5 for potential utilization in NOAA’s warning sys-  
6 tem, taking into consideration advancement in  
7 research and technology;

8 “(E) incorporate, as practicable, tsunami  
9 notifications and warnings in the USGS Earth-  
10 quake Early Warning System; and

11 “(F) incorporate, as practicable, prelimi-  
12 nary analysis or data from the National Earth-  
13 quake Information Center regarding the source  
14 and magnitude of an offshore earthquake within  
15 five minutes of detection;”;

16 (E) in paragraph (8)—

17 (i) by inserting “ and decision support  
18 aides” after “graphical warning products,”;  
19 and

20 (ii) by inserting “-prone” after “tsu-  
21 nami”;

22 (F) in paragraph (9), by striking “and”  
23 after the semicolon;

24 (G) in paragraph (10), by striking the pe-  
25 riod and inserting “; and”; and

1           (H) by adding at the end the following new  
2           paragraph:

3           “(11) update tsunami inundation maps, models,  
4           or other geographic products, in order to best support,  
5           as appropriate, relevant agencies with tsunami miti-  
6           gation and recovery activities.”;

7           (2) in subsection (c)—

8           (A) by striking paragraph (1) and redesign-  
9           ating paragraphs (2) and (3) as paragraphs  
10          (1) and (2), respectively; and

11          (B) in paragraph (1), as so redesignated—

12           (i) by striking “the Atlantic Ocean, in-  
13           cluding the Caribbean Sea and Gulf of Mex-  
14           ico, that are determined—” and inserting  
15           “the Pacific, Arctic, and Atlantic Oceans,  
16           including the Caribbean Sea and Gulf of  
17           Mexico, that are determined to pose signifi-  
18           cant risks of tsunami for States and United  
19           States territories along the coastal areas of  
20           such regions; and”;

21           (ii) by striking subparagraphs (A) and  
22           (B);

23          (3) by redesignating subsections (d), (e), (f), and  
24          (g) as subsections (e), (f), (g), and (h), respectively;

1           (4) by inserting after subsection (c) the following  
2           new subsection:

3           “(d) *TSUNAMI WARNING ALERT LEVEL EVALUA-*  
4           *TION.—The Administrator, in collaboration with social sci-*  
5           *entists, emergency personnel, and high-risk communities,*  
6           *shall—*

7           “(1) *evaluate tsunami alert levels terminology,*  
8           *timing, and effectiveness;*

9           “(2) *determine if such alerts produce the desired*  
10           *response and understanding from possible tsunami-*  
11           *prone communities; and*

12           “(3) *if necessary, update the alert level system*  
13           *for increased effectiveness.”;*

14           (5) *in subsection (e), as so redesignated—*

15           (A) *in paragraph (1)—*

16           (i) *in the matter preceding subpara-*  
17           *graph (A), by inserting “responsible for*  
18           *Alaska, the continental United States, Ha-*  
19           *waii, United States territories, and inter-*  
20           *national entities the Administrator deter-*  
21           *mines appropriate” before the period;*

22           (ii) *in subparagraph (A), by striking*  
23           *“which is primarily responsible for Alaska*  
24           *and the continental United States”;* and

1                   (iii) in subparagraph (B), by striking  
2                   “, which is primarily responsible for Ha-  
3                   warii, the Caribbean, and other areas of the  
4                   Pacific not covered by the National Center”;  
5                   (B) in paragraph (2)—

6                   (i) in subparagraph (A), by inserting  
7                   “current,” after “sea level,”;

8                   (ii) in subparagraph (B), by striking  
9                   “and volcanic eruptions” and inserting  
10                  “volcanic eruptions, or other sources”;

11                  (iii) in subparagraph (C), by striking  
12                  “buoy data and tidal” and inserting “and  
13                  coastal”;

14                  (iv) in subparagraph (E), by striking  
15                  “Integrated Ocean Observing System of the  
16                  Administration” and inserting “United  
17                  States and global ocean and coastal observ-  
18                  ing system”;

19                  (v) in subparagraph (H), by inserting  
20                  “monitoring needs,” after “response,”; and

21                  (vi) by amending subparagraph (I) to  
22                  read as follows:

23                  “(I) Providing a Tsunami Warning Coordi-  
24                  nator to coordinate with partners and stake-

1           *holders products and services of the centers sup-*  
2           *ported or maintained under paragraph (1).”;*

3           *(C) by amending paragraph (3) to read as*  
4           *follows:*

5           *“(3) FAIL-SAFE WARNING CAPABILITY.—The Ad-*  
6           *ministrator shall support and maintain fail-safe*  
7           *warning capability for the tsunami warning centers*  
8           *supported or maintained under paragraph (1), and*  
9           *such centers shall conduct at least one service back up*  
10          *drill biannually.”;*

11          *(D) in paragraph (4)—*

12           *(i) by amending the matter preceding*  
13           *subparagraph (A) to read as follows: “The*  
14           *Administrator shall coordinate with the*  
15           *weather forecast offices of the National*  
16           *Weather Service, the centers supported or*  
17           *maintained under paragraph (1), and such*  
18           *national and regional program offices of the*  
19           *Administration as the Administrator or the*  
20           *coordinating committee, as established in*  
21           *section 805(b), consider appropriate to en-*  
22           *sure that regional and local weather forecast*  
23           *offices—”;*

24           *(ii) in subparagraph (B), by striking*  
25           *“and” after the semicolon;*

1                   (iii) in subparagraph (C), by striking  
2                   the period and inserting “; and”; and

3                   (iv) by adding at the end the following  
4                   new subparagraph:

5                   “(D) conduct education and outreach efforts  
6                   to help prepare coastal communities for tsunami  
7                   hazards.”;

8                   (E) in paragraph (5)—

9                   (i) in the section heading, by striking  
10                  “UNIFORM” and inserting “STANDARD-  
11                  IZED”;

12                  (ii) in subparagraph (A), by striking  
13                  “uniform” and inserting “standardized”;

14                  (iii) in subparagraph (C)(ii), by strik-  
15                  ing “uniform” and inserting “standard-  
16                  ized”;

17                  (iv) in subparagraph (D), by striking  
18                  “and” after the semicolon;

19                  (v) in subparagraph (E), by striking  
20                  the period and inserting “; and”; and

21                  (vi) by adding at the end the following  
22                  new subparagraph:

23                  “(F) align the analytic techniques and  
24                  methodologies of the existing tsunami warning  
25                  centers supported or maintained under para-

1           *graph (1) to ensure seamless continuity of oper-*  
2           *ations and mitigate risk of operational failure*  
3           *by prioritizing investments that include—*

4                     *“(i) replacing end of life equipment;*

5                     *“(ii) ensuring product consistency;*

6                     *“(iii) enabling consistent operational*  
7                     *process for backup capabilities;*

8                     *“(iv) mitigating existing operational*  
9                     *security risks; and*

10                    *“(v) meeting information security re-*  
11                    *quirements specified in chapter 35 of title*  
12                    *44, United States Code.”; and*

13            *(F) by adding at the end the following new*  
14            *paragraph:*

15                    *“(7) REPORTING.—Not later than 180 days after*  
16            *the date of the enactment of this paragraph and an-*  
17            *nually thereafter until such time as all relevant re-*  
18            *quirements have been satisfied, the Administrator*  
19            *shall provide to the Committee on Science, Space, and*  
20            *Technology of the House of Representatives and the*  
21            *Committee on Commerce, Science, and Transpor-*  
22            *tation of the Senate an update briefing on the*  
23            *progress of the following:*

24                    *“(A) Standardizing products and proce-*  
25                    *dures under paragraph (5), including tsunami*

1           *assessments, forecast guidance, and related prod-*  
2           *ucts.*

3           “(B) *Migrating the message generation sys-*  
4           *tems of the centers supported or maintained*  
5           *under paragraph (1) to the Advanced Weather*  
6           *Information Processing Systems, or successor*  
7           *systems.*

8           “(C) *The structural reorganization effort, if*  
9           *necessary, to align such centers’ organizational*  
10          *charts.*

11          “(D) *The expected timeline for the full com-*  
12          *pletion of standardizing such centers’ products*  
13          *and procedures.”;*

14          (6) *in subsection (f), as so redesignated—*

15                 (A) *in paragraph (1)—*

16                         (i) *in the matter preceding subpara-*  
17                         *graph (A), by inserting “detect, measure,*  
18                         *and” after “used to”;*

19                         (ii) *in subparagraph (B), by striking*  
20                         *“and” after the semicolon;*

21                         (iii) *in subparagraph (C), by striking*  
22                         *“and the Advanced National Seismic Sys-*  
23                         *tem” and inserting “the Advanced National*  
24                         *Seismic System, and the global navigation*  
25                         *satellite system (GNSS); and”; and*

1                   (iv) by adding at the end the following  
2                   new subparagraph:

3                   “(D) ensure research is coordinated with  
4                   tsunami warning operations;”; and

5                   (B) in paragraph (3), by inserting “accord-  
6                   ing to industry best practices” before the period;  
7                   and

8                   (7) in subsection (h)(2)(A), as so redesignated,  
9                   by striking “accuracy of the tsunami model used”  
10                  and inserting “timeliness and accuracy of the forecast  
11                  used to issue the warning”.

12                  (d) NATIONAL TSUNAMI HAZARD MITIGATION PRO-  
13                  GRAM.—Section 805(c) of the Tsunami Warning and Edu-  
14                  cation Act (33 U.S.C. 3204(c)) is amended—

15                  (1) in paragraph (5)—

16                  (A) by redesignating subparagraphs (B),  
17                  (C), (D), (E), (F), and (G) as subparagraphs  
18                  (C), (D), (E), (F), (G), and (H), respectively;

19                  (B) by inserting after subparagraph (A) the  
20                  following new subparagraph:

21                  “(B) Coastal digital elevation models  
22                  (DEMs) to support the development of inunda-  
23                  tion maps.”; and

24                  (C) by adding at the end the following new  
25                  subparagraphs:

1           “(I) *Evaluation of the variation of inunda-*  
2           *tion impact resulting from tsunami-driven sedi-*  
3           *ment transport.*

4           “(J) *Evaluation of tsunami debris impact*  
5           *on critical infrastructure (as such term is de-*  
6           *finied in section 1016(e) of Public Law 107–56*  
7           *(42 U.S.C. 5195c(e)) and lifelines.*

8           “(K) *High-resolution and high-quality dig-*  
9           *ital elevation models needed for at-risk coast-*  
10           *lines, ports, and harbors, particularly for regions*  
11           *not covered by existing inundation maps.”; and*  
12           *(2) in paragraph (7)(C), by inserting “and be-*  
13           *havioral” after “social”;*

14           *(e) TSUNAMI RESEARCH PROGRAM.—Section 806 of*  
15           *the Tsunami Warning and Education Act (33 U.S.C. 3205)*  
16           *is amended—*

17           *(1) in subsection (a)—*

18                   *(A) by striking “section 805(d)” and insert-*  
19                   *ing “section 805(b)”;* and

20                   *(B) by inserting “and management” after*  
21                   *“data collection”;*

22           *(2) in subsection (b)—*

23                   *(A) in paragraph (1), by inserting “deploy-*  
24                   *ment and” after “may include”;*

1           (B) in paragraph (3), by striking “social  
2           science research” and inserting “social and be-  
3           havioral science research, including data collec-  
4           tion,”;

5           (C) in paragraph (4), by striking “and”  
6           after the semicolon;

7           (D) by redesignating paragraph (5) as  
8           paragraph (7); and

9           (E) by inserting after paragraph (4) the fol-  
10          lowing new paragraphs:

11          “(5) develop decision support tools;

12          “(6) leverage and prioritize research opportuni-  
13          ties; and”;

14          (3) by adding at the end the following new sub-  
15          section:

16          “(c) *RESEARCH AND DEVELOPMENT PLAN*.—Not later  
17          than 12 months after the date of the enactment of this sub-  
18          section and not less frequently than every 36 months there-  
19          after, the Administrator, in consultation with the Inter-  
20          agency Council for Advancing Meteorological Services, shall  
21          develop a research and development and research to oper-  
22          ations plan to improve tsunami detection and forecasting  
23          capabilities that—

24          “(1) identifies and prioritizes research and devel-  
25          opment priorities to satisfy section 804;

1           “(2) identifies key research needs for better de-  
2           tecting tsunamis that may occur in open ocean and  
3           along the coastlines of the United States and its terri-  
4           tories, improve forecasting of tsunamis that are not  
5           seismically driven, and other opportunities deter-  
6           mined appropriate;

7           “(3) develops plans for transitioning research to  
8           operations; and

9           “(4) identifies collaboration opportunities that  
10          may further and align tsunami research, develop-  
11          ment, warnings, and operations between the centers  
12          supported or maintained under section 804, the Na-  
13          tional Tsunami Hazard Mitigation Program, the Na-  
14          tional Oceanic and Atmospheric Administration Cen-  
15          ter for Tsunami Research, the National Science Foun-  
16          dation, the United States Geological Survey, the Fed-  
17          eral Emergency Management Agency, institutions of  
18          higher education, private entities, stakeholders, and  
19          others determined appropriate.”;

20          (f) *GLOBAL TSUNAMI WARNING AND MITIGATION NET-*  
21 *WORK.*—Section 807(d) of the *Tsunami Warning and Edu-*  
22 *cation Act (33 U.S.C. 3206(d))* is amended by inserting  
23 *“and management”* after *“data sharing”*;

24          (g) *TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY*  
25 *PANEL.*—Section 808(b)(1) of the *Tsunami Warning and*

1 *Education Act (33 U.S.C. 3206a(b)(1)) is amended by in-*  
2 *serting “and behavioral” after “social”;*

3 (h) *AUTHORIZATION OF APPROPRIATIONS.—Section*  
4 *809 of the Tsunami Warning and Education Act (33 U.S.C.*  
5 *3207) is amended to read as follows:*

6 **“SEC. 809. AUTHORIZATION OF APPROPRIATIONS.**

7 *“There are authorized to be appropriated to the Ad-*  
8 *ministrator to carry out this title \$30,000,000 for each of*  
9 *fiscal years 2024 through 2028, of which—*

10 *“(1) not less than 27 percent of the amount ap-*  
11 *propriated for each fiscal year shall be for activities*  
12 *conducted at the State level under the national tsu-*  
13 *nami hazard mitigation program under section 805;*  
14 *and*

15 *“(2) not less than 8 percent of the amount ap-*  
16 *propriated shall be for the tsunami research program*  
17 *under section 806.”.*

18 **SEC. 106. OBSERVING SYSTEM PLANNING.**

19 *Section 106 of the Weather Research and Forecasting*  
20 *Innovation Act of 2017 (15 U.S.C. 8516) is amended—*

21 *(1) in paragraph (3)—*

22 *(A) by inserting “Federal” before “observing*  
23 *capabilities”;* and

24 *(B) by striking “and” after the semicolon;*

25 *(2) in paragraph (4)—*

1           (A) by inserting “, including private sector  
2           partnerships or commercial acquisition,” after  
3           “options”; and

4           (B) by striking the period and inserting a  
5           semicolon; and

6           (3) by adding at the end the following new para-  
7           graphs:

8           “(5) compare costs and schedule, including cost-  
9           benefit analysis, of Federal and private sector supple-  
10          mental options to fill the observation data require-  
11          ments under paragraph (1) and gaps identified pur-  
12          suant to paragraph (3); and

13          “(6) not later than one year after the date of the  
14          enactment of this paragraph, submit to Congress a re-  
15          port that provides an analysis of the technical, sched-  
16          ule, cost, and cost benefit analyses to place an oper-  
17          ational polar-orbiting environmental satellite capa-  
18          bility in the early morning orbit to support the  
19          weather enterprise and the Administration’s mis-  
20          sion.”.

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

22          Section 107 of the Weather Research and Forecasting  
23          Innovation Act of 2017 (15 U.S.C. 8517) is amended—

24                 (1) in subsection (b)(3), by striking “providing  
25                 data” and inserting “comparison to current or exper-

1 *imental commercial system capabilities that provide*  
 2 *data”;*

3 *(2) in subsection (c)(1), by striking “, including*  
 4 *polar-orbiting and geostationary satellite systems,”;*

5 *(3) by striking subsection (d); and*

6 *(4) by redesignating subsection (e) as subsection*  
 7 *(d).*

8 **SEC. 108. COMPUTING RESOURCES PRIORITIZATION.**

9 *Section 108 of the Weather Research and Forecasting*  
 10 *Innovation Act of 2017 (15 U.S.C. 8518) is amended by*  
 11 *striking subsection (a)(3)(C) and all that follows through*  
 12 *subsection (b)(7) and inserting the following new sub-*  
 13 *sections:*

14 *“(b) COMPUTING RESEARCH INITIATIVE.—*

15 *“(1) IN GENERAL.—The Under Secretary, in col-*  
 16 *laboration with the Secretary of Energy, shall carry*  
 17 *out an initiative, which may leverage Department of*  
 18 *Energy high performance computers, cloud com-*  
 19 *puting, or expertise, to run advanced coupled models*  
 20 *in order to conduct proof of concept scenarios in com-*  
 21 *parison with current issued forecasts and models. The*  
 22 *Under Secretary and Secretary of Energy shall carry*  
 23 *out the initiative through a competitive, merit-re-*  
 24 *viewed process, and consider applications from Fed-*  
 25 *eral agencies, National Laboratories, institutions of*

1 *higher education (as such term is defined in section*  
2 *101 of the Higher Education Act of 1965 (20 U.S.C.*  
3 *1001)), nonprofit institutions, and other appropriate*  
4 *entities (or a consortia thereof).*

5 “(2) COMPONENTS.—*In carrying out the initia-*  
6 *tive under paragraph (1), the Under Secretary shall*  
7 *prevent duplication and coordinate research efforts in*  
8 *artificial intelligence, high performance computing,*  
9 *cloud computing, quantum computing, modeling and*  
10 *simulation, machine learning, data assimilation,*  
11 *large scale data analytics, and predictive analysis*  
12 *across the National Oceanic and Atmospheric Admin-*  
13 *istration, and may—*

14 “(A) *conduct research to compare National*  
15 *Weather Service forecast and model outputs to*  
16 *predictions and model outputs developed through*  
17 *such initiative;*

18 “(B) *share relevant modeling system and*  
19 *applications innovations developed through such*  
20 *initiative, including Unified Forecast System-*  
21 *based applications, through community-based ac-*  
22 *tivities, in accordance with section 10601 of the*  
23 *James M. Inhofe National Defense Authorization*  
24 *Act for Fiscal Year 2023 (15 U.S.C. 8512a);*

1           “(C) leverage coordinating activities man-  
2 aged by the National Science and Technology  
3 Council, the Interagency Council for Advancing  
4 Meteorological Services, and other relevant inter-  
5 agency entities;

6           “(D) provide sufficient capacity for long-  
7 term archive and access of model output to sup-  
8 port research and long-term study;

9           “(E) determine computing decisions based  
10 on an agile requirements framework; and

11           “(F) support the training, recruitment, and  
12 retention of the next generation weather, water,  
13 and climate computing workforce through incen-  
14 tives and pathways for career development and  
15 employment opportunities.

16           “(3) *RESEARCH SECURITY*.—The activities au-  
17 thorized under this section shall be applied in a man-  
18 ner consistent with subtitle D of title VI of the Re-  
19 search and Development, Competition, and Innova-  
20 tion Act (enacted as division B of Public Law 117–  
21 167; 42 U.S.C. 19231 et seq.).

22           “(4) *TERMINATION*.—The authority under this  
23 subsection shall terminate five years after the date of  
24 the enactment of this subsection.

1           “(c) *ARTIFICIAL INTELLIGENCE INVESTMENTS.*—The  
2 *Under Secretary shall leverage artificial intelligence and*  
3 *machine learning technologies to facilitate, optimize, and*  
4 *further leverage advanced computing to accomplish critical*  
5 *missions of the National Oceanic and Atmospheric Admin-*  
6 *istration by enhancing existing and forthcoming high-per-*  
7 *formance and cloud computing infrastructure or systems.*

8           “(d) *CENTERS OF EXCELLENCE.*—The *Under Sec-*  
9 *retary may expand, and where applicable establish, centers*  
10 *of excellence to aid the adoption of next-generation artificial*  
11 *intelligence and machine learning enabled advanced com-*  
12 *puting capabilities. Each such center may carry out activi-*  
13 *ties that include the following:*

14                 “(1) *Leveraging robust public-private partner-*  
15 *ship models to provide access to training, experience,*  
16 *and long-term development of workforce and infra-*  
17 *structure.*

18                 “(2) *Developing and optimizing tools, libraries,*  
19 *algorithms, data structures, and other supporting*  
20 *software necessary for specific applications on high*  
21 *performance computing systems.*

22                 “(3) *Applying modern artificial intelligence,*  
23 *deep machine-learning, and advanced data analysis*  
24 *technologies to address current and future mission*  
25 *challenges.*

1           “(4) *To the maximum extent practicable, explore*  
2           *quantum computing and related application partner-*  
3           *ships with public, private, and academic entities to*  
4           *improve the accuracy and resolution of weather pre-*  
5           *dictions.*

6           “(e) *MULTI-YEAR CONTRACTS.—The Under Secretary*  
7           *may enter into multi-year contracts in accordance with sec-*  
8           *tion 3903 of title 41, United States Code, and shall ensure*  
9           *compliance with all clauses provided in such section to sup-*  
10           *port operations, research, and development related to high*  
11           *performance and cloud computing infrastructure or systems*  
12           *with an unfunded contingent liability in the event of can-*  
13           *cellation.*

14           “(f) *REPORT.—Not later than two years after the date*  
15           *of the enactment of this subsection, the Under Secretary*  
16           *shall submit to the Committee on Science, Space, and Tech-*  
17           *nology of the House of Representatives and the Committee*  
18           *on Commerce, Science, and Transportation and the Com-*  
19           *mittee on Energy and Natural Resources of the Senate a*  
20           *report evaluating the following:*

21           “(1) *The effectiveness of the initiative required*  
22           *under subsection (b), including applied research dis-*  
23           *coveries and advanced modeling improvements*  
24           *achieved.*

1           “(2) A best estimate of the overall value of high-  
2           resolution probabilistic forecast guidance for haz-  
3           ardous weather or water events (as such term is de-  
4           fined in section 406) using a next-generation weather  
5           forecast and warning framework.

6           “(3) The needs for cloud computing, quantum  
7           computing, or high-performance computing, visual-  
8           ization, and dissemination collaboration between the  
9           Department of Energy and the National Oceanic and  
10          Atmospheric Administration.

11          “(4) A timeline and guidance for implementa-  
12          tion of the following:

13                 “(A) High-resolution numerical weather  
14                 prediction models.

15                 “(B) Methods for meeting the cloud com-  
16                 puting, quantum computing, or high-perform-  
17                 ance computing, visualization, and dissemina-  
18                 tion needs identified under paragraph (3).”.

19 **SEC. 109. EARTH PREDICTION INNOVATION CENTER.**

20          Paragraph (5) of section 102(b) of the Weather Re-  
21          search and Forecasting Innovation Act of 2017 (15 U.S.C.  
22          8512(b)) is amended—

23                 (1) in subparagraph (D), by striking “and” after  
24          the semicolon; and

1           (2) *by striking subparagraph (E) and inserting*  
2 *the following new subparagraphs:*

3           “(E) *developing community weather re-*  
4 *search modeling systems that—*

5           “(i) *are accessible by the public in ac-*  
6 *cordance with section 10601 of the James*  
7 *M. Inhofe National Defense Authorization*  
8 *Act for Fiscal Year 2023 (15 U.S.C. 8512a)*  
9 *and available for archive and long-term*  
10 *study;*

11           “(ii) *meet basic end-user requirements*  
12 *for running on public computers and net-*  
13 *works located outside of secure National*  
14 *Oceanic and Atmospheric Administration*  
15 *information and technology systems;*

16           “(iii) *utilize, whenever appropriate*  
17 *and cost-effective, innovative strategies and*  
18 *methods, including cloud-based computing*  
19 *capabilities, for hosting and management of*  
20 *part or all of the system described in this*  
21 *subparagraph;*

22           “(iv) *utilize modeling systems that*  
23 *allow for interoperability with new model*  
24 *components, modules, and next-generation*  
25 *software and coding languages;*

1           “(v) allow for open testing and inte-  
2           gration of promising operational model im-  
3           provements from the broader community;

4           “(vi) access as close to a real-time  
5           basis as possible operational data and  
6           metadata, including commercially pur-  
7           chased data for use in Earth Prediction In-  
8           novation Center research and development  
9           testing grounds pursuant to redistribution  
10          restrictions, licensing agreements, and ap-  
11          plicable existing laws and regulations; and

12          “(vii) provide supported and portable  
13          versions of the unified forecast system, in-  
14          cluding applications for hurricane, space  
15          weather, ocean, cryosphere, air quality, and  
16          coastal models, that can reproduce current  
17          operational global and regional model pre-  
18          diction; and

19          “(F) establishing a National Oceanic and  
20          Atmospheric Administration Data Lake, to be  
21          maintained by the Administration, a commercial  
22          partner, or non-profit entity, that consolidates  
23          and maintains a publicly available and continu-  
24          ously updated collection of data and metadata  
25          used in numerical weather prediction for use in

1           *the Earth Prediction Innovation Center’s model*  
2           *testing, pursuant to redistribution restrictions,*  
3           *licensing agreements, and applicable existing*  
4           *laws and regulations.”.*

5 **SEC. 110. SATELLITE ARCHITECTURE PLANNING.**

6           *Section 301 of the Weather Research and Forecasting*  
7 *Innovation Act of 2017 (15 U.S.C. 8531) is amended—*

8                   *(1) in subsection (a), by striking paragraph (1)*  
9                   *and redesignating paragraphs (2), (3), and (4) as*  
10                   *paragraphs (1), (2), and (3), respectively;*

11                   *(2) by amending subsection (b) to read as fol-*  
12                   *lows:*

13                   “*(b) NATIONAL OCEANIC AND ATMOSPHERIC ADMINIS-*  
14 *TRATION SATELLITE SYSTEMS AND DATA.—*

15                   “*(1) IN GENERAL.—The Under Secretary shall*  
16                   *maintain a fleet of Administration space-based obser-*  
17                   *vation platforms that provide critical operations-fo-*  
18                   *cused data and information to support the National*  
19                   *Oceanic and Atmospheric Administration’s mission to*  
20                   *monitor the global environment in order to protect*  
21                   *lives and property from extreme weather and other*  
22                   *natural phenomena.*

23                   “*(2) COLLABORATION.—The Under Secretary*  
24                   *shall implement recommendations from the NOAA*  
25                   *Observing Systems Council to ensure an appropriate*

1 *mix of government, academic, commercial sector, and*  
2 *international partnerships in the provision of data*  
3 *and information, including a broadened effort on*  
4 *data acquisition through the Commercial Data Pro-*  
5 *gram under section 302 when cost effective and bene-*  
6 *ficial to the Administration.*

7 “(3) *PRIORITY.—The Under Secretary shall en-*  
8 *sure that Administration platforms maintained under*  
9 *paragraph (1) prioritize the development of products*  
10 *and services that are tailored to meet the National*  
11 *Oceanic and Atmospheric Administration’s mission.*

12 “(4) *NATIONAL CENTERS FOR ENVIRONMENTAL*  
13 *INFORMATION.—The Under Secretary shall maintain*  
14 *the National Centers for Environmental Information*  
15 *to provide a long-term archive and access to the Ad-*  
16 *ministration’s national and global data and*  
17 *metadata.”; and*

18 *(3) in subsection (f)(1), by striking “2023” and*  
19 *inserting “2030”.*

20 **SEC. 111. IMPROVING UNCREWED ACTIVITIES.**

21 *Subparagraph (G) of section 102(b)(3) of the Weather*  
22 *Research and Forecasting Innovation Act of 2017 (15*  
23 *U.S.C. 8512(b)(3)) is amended by striking “, including*  
24 *commercial observing systems” and inserting “, including*  
25 *stationary and mobile commercial observing systems, such*

1 *as uncrewed aircraft and marine systems, to provide obser-*  
 2 *vations of the atmosphere and ocean, and other observa-*  
 3 *tions, in cooperation with the Office of Marine and Avia-*  
 4 *tion Operations”.*

5 **SEC. 112. INTERAGENCY COUNCIL FOR ADVANCING METE-**  
 6 **OROLOGICAL SERVICES.**

7 (a) *IN GENERAL.*—Section 402 of the Weather Re-  
 8 search and Forecasting Innovation Act of 2017 (15 U.S.C.  
 9 8542) is amended—

10 (1) *in subsection (a)*—

11 (A) *by striking “Advancing Weather Serv-*  
 12 *ices” and inserting “Advancing Meteorological*  
 13 *Services (in this section referred to as the ‘Inter-*  
 14 *agency Council’); and*

15 (B) *by striking “Committee” each place it*  
 16 *appears and inserting “Council”;*

17 (2) *by amending subsections (b) and (c) to read*  
 18 *as follows:*

19 “(b) *CO-CHAIRS.*—The Director of the Office of Science  
 20 and Technology Policy and the Under Secretary shall serve  
 21 as co-chairs of the Interagency Council. The Under Sec-  
 22 retary shall serve as the Federal Coordinator for Meteor-  
 23 ology.

24 “(c) *FURTHER COORDINATION.*—The Director of the  
 25 Office of Science and Technology Policy shall take such

1 *steps as are necessary to coordinate the activities of the Fed-*  
2 *eral Government with stakeholders in the United States*  
3 *weather industry, academic partners, State governments,*  
4 *and emergency managers, including by implementing*  
5 *mechanisms to encourage and enable the participation of*  
6 *non-Federal employees in the functions of the Interagency*  
7 *Council.”;*

8           (3) *by adding at the end the following new sub-*  
9 *sections:*

10       “(d) *FUNCTIONS.—The Interagency Council shall be*  
11 *the formal mechanism by which all relevant Federal depart-*  
12 *ments and agencies coordinate implementation of policy*  
13 *and practices to ensure United States global leadership in*  
14 *meteorological services. In doing so, the Interagency Council*  
15 *shall review programs and support relevant weather re-*  
16 *search and forecast innovation activities, as well as other*  
17 *related implementation activities, related to Federal mete-*  
18 *orological services, including by carrying out the following:*

19           “(1) *Identifying and helping prioritize meteoro-*  
20 *logical research and service delivery needs, including*  
21 *relating to observations, operational systems, commu-*  
22 *nications, and infrastructure.*

23           “(2) *Providing recommendations to streamline*  
24 *or consolidate activities and develop greater effi-*  
25 *ciencies in cross-agency activities.*

1           “(3) *Leveraging Earth system science research*  
2           *outcomes of the National Oceanic and Atmospheric*  
3           *Administration, the National Aeronautics and Space*  
4           *Administration, and other relevant Federal depart-*  
5           *ments and agencies, including research outcomes re-*  
6           *lated to the relevant recommended key science and ap-*  
7           *lications questions and priorities in the National*  
8           *Academies of Sciences, Engineering, and Medicine’s*  
9           *2018 report ‘Thriving on Our Changing Planet: A*  
10           *Decadal Strategy for Earth Observation from Space’,*  
11           *to understand and predict high-impact weather phe-*  
12           *nomena.*

13           “(4) *Facilitating the expansion and strength-*  
14           *ening of partnerships with private sector entities to*  
15           *advance meteorological research, communications,*  
16           *and computing in collaboration with the Earth sys-*  
17           *tem science, service, and stakeholder communities.*

18           “(5) *Sharing information regarding meteorolog-*  
19           *ical research improvement needs and science opportu-*  
20           *nities across relevant Federal departments and agen-*  
21           *cies.*

22           “(6) *Providing advice to all relevant Federal de-*  
23           *partments and agencies regarding potential collabora-*  
24           *tions and expected level of resources needed to main-*  
25           *tain and operate the Interagency Council.*

1           “(7) *Enhancing communication and coordina-*  
2           *tion and promoting sharing within relevant Federal*  
3           *departments and agencies and across the Interagency*  
4           *Council.*

5           “(8) *Developing, recruiting, and sustaining a*  
6           *professional and diverse workforce for meteorological*  
7           *research and services.*

8           “(e) *DATA INVENTORY.—The Interagency Council, in*  
9           *coordination and avoidance of duplication with the United*  
10          *States Group on Earth Observations, shall promote data*  
11          *and metadata access and archive activities to increase ac-*  
12          *cessibility, interoperability, and reusability by maintain-*  
13          *ing a data inventory of meteorological observations. Not less*  
14          *frequently than annually for a period of five years begin-*  
15          *ning on the date of the enactment of this subsection, the*  
16          *Interagency Council shall solicit updated information from*  
17          *private sector entities identifying current and near future*  
18          *sources of such data. Such data shall be made available to*  
19          *member departments and agencies under subsection (a).*

20          “(f) *COORDINATION OFFICE.—The Interagency Mete-*  
21          *orological Coordination Office shall provide to the Inter-*  
22          *agency Council such administrative and logistical support*  
23          *as the Interagency Council may require, as determined by*  
24          *the co-chairs.*

1       “(g) *COST SHARE*.—Member departments and agen-  
2       cies of the Interagency Council under subsection (a) may  
3       provide reimbursable financial support to the Interagency  
4       Meteorological Coordinating Office to enhance cost-sharing  
5       and collaboration related to weather research and forecast  
6       innovation activities.

7       “(h) *REPORT*.—Not later than one year after the date  
8       of the enactment of this subsection and annually thereafter,  
9       the Interagency Council shall publish a report which identi-  
10      fies among member agencies the following:

11               “(1) *Federal programs that use meteorological*  
12              *observations, data sources, and capabilities.*

13               “(2) *Federal programs that acquire such data*  
14              *from private sector entities.*

15               “(3) *Advancements in meteorological data collec-*  
16              *tion, assimilation, and forecasting that could improve*  
17              *Federal programmatic operational capabilities.*

18               “(4) *Barriers to acquiring meteorological obser-*  
19              *vations, data sources, and capabilities that could be*  
20              *used to better meet Federal programmatic needs.”.*

21       “(b) *REFERENCES*.—Any reference to the Interagency  
22       Committee for Advancing Weather Services in any law,  
23       rule, regulation, paper, record, map, or other such document  
24       of the United States shall be deemed to be a reference to

1 *the Interagency Council for Advancing Meteorological Serv-*  
2 *ices.*

3 **SEC. 113. OCEAN OBSERVATIONS.**

4 *Subsection (b) of section 12304 of the Integrated Coast-*  
5 *al and Ocean Observation System Act of 2009 (33 U.S.C.*  
6 *3603) is amended by adding at the end the following new*  
7 *paragraph:*

8 “(5) *SHIPS OF OPPORTUNITY PILOT PROGRAM.—*

9 “(A) *IN GENERAL.—The Administrator, in*  
10 *coordination with the heads of relevant Federal*  
11 *departments and agencies, shall, subject to rel-*  
12 *evant regulations and certifications, maintain*  
13 *pilot programs or projects to contract with re-*  
14 *search or commercial ship operators for data col-*  
15 *lection and assess the potential costs, benefits,*  
16 *and viability of a global network of ocean and*  
17 *atmospheric observing instruments operating on*  
18 *research or commercial ocean vessels, including*  
19 *in the Arctic, in order to supplement the Inte-*  
20 *grated Coastal, Great Lakes, and Ocean Observa-*  
21 *tion System in improving understanding of*  
22 *coastal and ocean systems and their relation-*  
23 *ships to human activities.*

24 “(B) *STANDARDS AND SPECIFICATIONS.—*

25 *The Administrator shall ensure that data ac-*

1           *quired through the pilot program established*  
2           *pursuant to subparagraph (A) meets the most re-*  
3           *cent standards and specifications required for*  
4           *observation services and data as published pur-*  
5           *suant to subsection (c) of section 302 of the*  
6           *Weather Research and Forecasting Innovation*  
7           *Act of 2017.*

8           “(C) *REPORT.*—*Not later than five years*  
9           *after the date of the enactment of this paragraph,*  
10          *the Administrator, in consultation with the Sec-*  
11          *retary of Transportation, shall submit to Con-*  
12          *gress a report on the requirements for a global*  
13          *network of ocean and atmospheric instruments*  
14          *operating on research or commercial ocean ves-*  
15          *sels for measurement and data transmission.*

16          “(D) *SUNSET.*—*This paragraph shall ter-*  
17          *minate on the earlier of—*

18                  “(i) *September 30, 2029; or*

19                  “(ii) *one year after the date on which*  
20                  *the report required under subparagraph (B)*  
21                  *is submitted by the Administrator.”.*

22   **SEC. 114. CONSOLIDATION OF REPORTS.**

23           (a) *WEATHER RESEARCH AND FORECASTING INNOVA-*  
24    *TION ACT OF 2017.*—

1           (1) *IN GENERAL.*—*The Weather Research and*  
2           *Forecasting Innovation Act of 2017 is amended—*

3                   (A) *in section 102 (15 U.S.C. 8512), by*  
4                   *striking subsection (d);*

5                   (B) *by amending section 105 (15 U.S.C.*  
6                   *8515) to read as follows:*

7           **“SEC. 105. WEATHER RESEARCH AND DEVELOPMENT PLAN-**  
8                   **NING.**

9           *“Not later than two years after the date of the enact-*  
10           *ment of this section and not less frequently than semiannu-*  
11           *ally thereafter, the Under Secretary, acting through the As-*  
12           *sistant Administrator for Oceanic and Atmospheric Re-*  
13           *search, and in coordination with the Director of the Na-*  
14           *tional Weather Service and the Assistant Administrator for*  
15           *Satellite and Information Services, shall issue a research*  
16           *and development and research to operations plan to main-*  
17           *tain United States leadership in numerical weather pre-*  
18           *diction and forecasting that—*

19                   *“(1) describes the forecasting skill and technology*  
20                   *goals, objectives, expected budget, and progress of the*  
21                   *National Oceanic and Atmospheric Administration in*  
22                   *carrying out the program conducted under section*  
23                   *102;*

24                   *“(2) identifies and prioritizes specific research*  
25                   *and development activities, data collection and anal-*

1 *ysis, predictive modeling, demonstration of potential*  
2 *operational forecast application, education, training,*  
3 *and performance metrics, weighted to meet the oper-*  
4 *ational weather and flood-event mission of the Na-*  
5 *tional Weather Service to achieve a weather-ready*  
6 *Nation;*

7 *“(3) describes how the program conducted under*  
8 *section 102 will collaborate with Federal agencies and*  
9 *departments, international partners, and stake-*  
10 *holders, including the United States weather industry*  
11 *and academic partners, and the role of each in ad-*  
12 *vancing weather forecasting and communication;*

13 *“(4) identifies, through consultation with the Na-*  
14 *tional Science Foundation, the United States weather*  
15 *industry, and academic partners, research necessary*  
16 *to advance the scientific understanding of weather*  
17 *processes and provide information to improve weather*  
18 *warning and forecast systems in the United States*  
19 *most effectively; and*

20 *“(5) describes how the National Oceanic and At-*  
21 *mospheric Administration is advancing community*  
22 *weather modeling.”;*

23 *(C) in section 403 (15 U.S.C. 8543)—*

24 *(i) in subsection (a), by inserting “the”*  
25 *after “Director of”; and*

1                   (ii) by amending subsection (d) to read  
2                   as follows:

3           “(d) ANNUAL BRIEFING.—Not less frequently than  
4 once each year, the Under Secretary shall brief the Com-  
5 mittee on Commerce, Science, and Transportation of the  
6 Senate and the Committee on Science, Space, and Tech-  
7 nology of the House of Representatives on participation in  
8 the program under subsection (a) and shall highlight any  
9 innovations that come from the interaction described in  
10 subsection (b).”; and

11                   (D) by striking sections 408 through 411  
12 and section 414 and redesignating sections 412  
13 and 413 as sections 408 and 409, respectively.

14           (2) CLERICAL AMENDMENTS.—The table of con-  
15 tents in section 1(b) of the Weather Research and  
16 Forecasting Innovation Act of 2017 is amended by  
17 striking the items relating to sections 408 through 414  
18 and inserting the following new items:

“Sec. 408. Weather enterprise outreach.

“Sec. 409. Hurricane hunter aircraft.”.

19           (b) NATIONAL OCEANIC AND ATMOSPHERIC ADMINIS-  
20 TRATION AUTHORIZATION ACT OF 1992.—The National  
21 Oceanic and Atmospheric Administration Authorization  
22 Act of 1992 (Public Law 102–567) is amended—

23                   (1) in section 106, by striking subsection (c) (15  
24 U.S.C. 1537); and

1           (2) *in section 108 (15 U.S.C. 8520)—*  
2                    (A) *by striking subsection (b); and*  
3                    (B) *by redesignating subsection (c) as sub-*  
4                    *section (b).*

5 **SEC. 115. NATIONAL LANDSLIDE HAZARDS REDUCTION**  
6                    **PROGRAM.**

7           *Subsection (h) of section 3 of the National Landslide*  
8 *Preparedness Act (43 U.S.C. 3102) is amended, in the mat-*  
9 *ter preceding paragraph (1), by striking “2021 through*  
10 *2024” and inserting “2024 through 2028”.*

11 **SEC. 116. AMENDMENTS TO THE HARMFUL ALGAL BLOOM**  
12                    **AND HYPOXIA RESEARCH AND CONTROL ACT**  
13                    **OF 1998.**

14           (a) *ASSESSMENTS.—Section 603 of the Harmful Algal*  
15 *Bloom and Hypoxia Research and Control Act of 1998 (33*  
16 *U.S.C. 4001) is amended—*

17                    (1) *in subsection (a)—*  
18                            (A) *by renumbering paragraphs (13) and*  
19                            *(14) as paragraphs (14) and (15), respectively;*  
20                            *and*  
21                            (B) *by inserting after paragraph (12) the*  
22                            *following new paragraph:*  
23                            *“(13) the Department of Energy;”.*

1           (2) *by striking subsections (b), (c), (d), (e), (h),*  
2           *and (i) and redesignating subsections (f) and (g) as*  
3           *subsections (b) and (c), respectively;*

4           (3) *in subsection (b), as so redesignated—*

5                 (A) *in paragraph (1), by striking “coastal*  
6                 *waters including the Great Lakes” and inserting*  
7                 *“marine, estuarine, and freshwater systems”;*  
8                 *and*

9                 (B) *in paragraph (2)—*

10                     (i) *by amending subparagraph (A) to*  
11                     *read as follows:*

12                         “(A) *examine the causes and ecological con-*  
13                         *sequences of hypoxia on marine and aquatic spe-*  
14                         *cies in their natural environments, and socio-*  
15                         *cultural or economic costs of hypoxia, including*  
16                         *impacts on food safety and security;”;*

17                     (ii) *by redesignating subparagraphs*  
18                     *(B) through (D) as subparagraphs (D)*  
19                     *through (F), respectively;*

20                     (iii) *by inserting after subparagraph*  
21                     *(A) the following new subparagraphs:*

22                         “(B) *examine the effect of other environ-*  
23                         *mental stressors on hypoxia;*

1           “(C) evaluate alternatives for reducing,  
2 mitigating, and controlling hypoxia and its en-  
3 vironmental impacts;”;

4           (iv) in subparagraph (D), as so redes-  
5 igned, by inserting “, social,” after “eco-  
6 logical”; and

7           (v) in subparagraph (E), as so redesign-  
8 ated, by striking “hypoxia modeling and  
9 monitoring data” and inserting “hypoxia  
10 modeling, forecasting, and monitoring and  
11 observation data”; and

12           (4) in subsection (c), as so redesignated, by  
13 mending such subsection to read as follows:

14           “(c) ACTION STRATEGY AND SCIENTIFIC ASSESSMENT  
15 FOR MARINE AND FRESHWATER HARMFUL ALGAL  
16 BLOOMS.—

17           “(1) Not less often than once every five years, the  
18 Task Force shall complete and submit to Congress an  
19 action strategy, including a scientific assessment, of  
20 harmful algal blooms in the United States (in this  
21 Act referred to as the ‘Action Strategy’). Each such  
22 Action Strategy, including scientific assessment, shall  
23 examine both marine and freshwater harmful algal  
24 blooms, including those in the Great Lakes and upper  
25 reaches of estuaries, those in freshwater lakes and riv-

1        *ers, and those that originate in freshwater lakes or*  
2        *rivers and migrate to coastal waters.*

3            *“(2) Each Action Strategy under this subsection*  
4        *shall—*

5            *“(A) examine the causes and ecological con-*  
6        *sequences, and the socio-cultural or economic*  
7        *costs, including impacts on food safety and secu-*  
8        *rity, of harmful algal blooms;*

9            *“(B) examine the effect of other environ-*  
10       *mental stressors on harmful algal blooms;*

11          *“(C) examine potential methods to prevent,*  
12       *control, and mitigate harmful algal blooms and*  
13       *the potential ecological, social, cultural, and eco-*  
14       *nom ic costs and benefits of such methods;*

15          *“(D) identify priorities for research needed*  
16       *to advance techniques and technologies to detect,*  
17       *predict, monitor, respond to, and minimize the*  
18       *occurrence, duration, and severity of harmful*  
19       *algal blooms, including recommendations to*  
20       *eliminate significant gaps in harmful algal*  
21       *bloom forecasting, monitoring, and observation*  
22       *data;*

23          *“(E) evaluate progress made by, and the*  
24       *needs of, Task Force activities and actions to*

1           *prevent, control, and mitigate harmful algal*  
2           *blooms;*

3           “(F) *identify ways to improve coordination*  
4           *and prevent unnecessary duplication of effort*  
5           *among Federal departments and agencies with*  
6           *respect to research on harmful algal blooms; and*

7           “(G) *include regional chapters relating to*  
8           *the requirements described in this paragraph in*  
9           *order to highlight geographically and ecologically*  
10          *diverse locations with significant ecological, so-*  
11          *cial, cultural, and economic impacts from harm-*  
12          *ful algal blooms.”.*

13          (b) *CONSULTATIONS.—Section 102 of the Harmful*  
14          *Algal Bloom and Hypoxia Amendments Act of 2004 (33*  
15          *U.S.C. 4001a) is amended—*

16                 (1) *by striking “the coastal”;*

17                 (2) *by inserting “and” after “Indian tribes,”;*

18                 (3) *by inserting “and” after “local govern-*  
19                 *ments,”; and*

20                 (4) *by striking “with expertise in coastal zone*  
21                 *science and management” and inserting “with rel-*  
22                 *evant expertise”.*

23          (c) *NATIONAL HARMFUL ALGAL BLOOM AND HYPOXIA*  
24          *PROGRAM.—Section 603A of the Harmful Algal Bloom and*

1 *Hypoxia Research and Control Act of 1998 (33 U.S.C.*  
2 *4002) is amended—*

3 *(1) in subsection (a)—*

4 *(A) in paragraph (1)—*

5 *(i) by striking “predicting,” and in-*  
6 *serting “monitoring, observing, fore-*  
7 *casting,”; and*

8 *(ii) by striking “and” after the semi-*  
9 *colon;*

10 *(B) in paragraph (2)—*

11 *(i) by striking “comprehensive research*  
12 *plan and action strategy under section*  
13 *603B” and inserting “the Action Strategy,*  
14 *including scientific assessment, under sec-*  
15 *tion 603(c)”;* and

16 *(ii) by striking the period and insert-*  
17 *ing “; and”;* and

18 *(C) by adding at the end the following new*  
19 *paragraph:*

20 *“(3) the scientific assessment under section*  
21 *603(b).”;*

22 *(2) in subsection (c)—*

23 *(A) in paragraph (3), by striking “ocean*  
24 *and Great Lakes” and inserting “marine, estua-*  
25 *rine, and freshwater systems”;* and

1           (B) in paragraph (5), by inserting “while  
2           recognizing each agency is acting under its own  
3           independent mission and authority” before the  
4           semicolon;

5           (3) in subsection (d), by striking “Except as pro-  
6           vided in subsection (h), the” and inserting “The”;

7           (4) in subsection (e)—

8           (A) by amending paragraph (2) to read as  
9           follows:

10           “(2) examine, in collaboration with State and  
11           local entities and Indian Tribes, including island  
12           communities, low-population rural communities, In-  
13           digenous communities, subsistence communities, fish-  
14           eries, and recreation industries that are most depend-  
15           ent on coastal and water resources that may be im-  
16           pacted by marine and freshwater harmful algal  
17           blooms and hypoxia, the causes, ecological con-  
18           sequences, cultural impacts, and social and economic  
19           costs of harmful algal blooms and hypoxia;”;

20           (B) by striking paragraph (3);

21           (C) by redesignating paragraphs (4), (5),  
22           and (6) as paragraphs (3), (4), and (5), respec-  
23           tively;

24           (D) in paragraph (3), as so redesignated—

1           (i) by striking “to, regional” and in-  
2           serting “to regional”; and

3           (ii) by striking “agencies” and insert-  
4           ing “entities, and regional coastal observing  
5           systems (as such term is defined in section  
6           12330(6) of the Integrated Coastal and  
7           Ocean Observation System Act of 2009 (33  
8           U.S.C. 3602(6)))”;

9           (E) in paragraph (5), as so redesignated, by  
10          inserting “and communities” after “ecosystems”;

11          (F) by inserting after paragraph (5) (as re-  
12          designated) the following new paragraph:

13          “(6) support sustained observations, including  
14          through peer-reviewed, merit-based, competitive grant  
15          funding, to provide State and local entities, Indian  
16          Tribes, and others access to real-time or near real-  
17          time observation data for decision-making to protect  
18          human and ecological health and local economies;”;

19          (G) in paragraph (8), by striking “State  
20          and local” and inserting “State, local, and Trib-  
21          al”; and

22          (H) in paragraph (9)(A), by striking “trib-  
23          al” and inserting “Tribal”;

24          (5) by amending subsections (f) and (g) to read  
25          as follows:

1       “(f) *COOPERATIVE EFFORTS.*—*The Under Secretary*  
2 *shall work cooperatively with and avoid duplication of ef-*  
3 *fort of other agencies on the Task Force, and with and of*  
4 *States, Indian tribes, and nongovernmental organizations*  
5 *concerned with marine and freshwater issues, and shall co-*  
6 *ordinate harmful algal bloom and hypoxia and related ac-*  
7 *tivities and research.*

8       “(g) *FRESHWATER AND ESTUARINE PROGRAM DU-*  
9 *TIES.*—

10               “(1) *IN GENERAL.*—*The Administrator, in co-*  
11 *ordination with the Task Force, shall carry out the*  
12 *duties under subsection (e) for freshwater and estua-*  
13 *rine aspects of the Program through the activities au-*  
14 *thorized under section 603C.*

15               “(2) *NONDUPLICATION.*—*The Administrator*  
16 *shall ensure that activities carried out under this sub-*  
17 *section focus on new approaches to addressing fresh-*  
18 *water harmful algal blooms and are not duplicative*  
19 *of existing research and development programs au-*  
20 *thorized under this Act or any other law.”; and*

21               (6) *by amending subsection (h) to read as fol-*  
22 *lows:*

23       “(h) *ANTI-DEFICIENCY ACT APPLIED TO HARMFUL*  
24 *ALGAL BLOOM SERVICES.*—*Any services by an officer or*  
25 *employee under this title relating to the immediate develop-*

1 *ment and dissemination of the Harmful Algal Bloom Oper-*  
2 *ational Forecast System of the National Centers for Coastal*  
3 *Ocean Science and the National Oceanic and Atmospheric*  
4 *Administration shall be considered, for purposes of section*  
5 *1342 of title 31, United States Code, services for emergencies*  
6 *involving the safety of human life or the protection of prop-*  
7 *erty. Such consideration shall only apply to areas with ac-*  
8 *tive harmful algal blooms during any lapse in appropria-*  
9 *tions beginning on or after the date of the enactment of this*  
10 *subsection.”.*

11 *(d) NATIONAL OCEANIC AND ATMOSPHERIC ADMINIS-*  
12 *TRATION ACTIVITIES.—*

13 *(1) IN GENERAL.—The Harmful Algal Bloom*  
14 *and Hypoxia Research and Control Act of 1998 is*  
15 *amended by amending section 603B (33 U.S.C. 4003)*  
16 *to read as follows:*

17 **“SEC. 603B. NATIONAL OCEANIC AND ATMOSPHERIC AD-**  
18 **MINISTRATION ACTIVITIES.**

19 *“(a) IN GENERAL.—The Under Secretary shall—*

20 *“(1) carry out marine, coastal, and Great Lakes*  
21 *harmful algal bloom and hypoxia events response ac-*  
22 *tivities;*

23 *“(2) develop and enhance operational harmful*  
24 *algal bloom observing and forecasting programs, in-*  
25 *cluding operational observations and forecasting,*

1        *monitoring, modeling, data management, and infor-*  
2        *mation dissemination;*

3                *“(3) maintain and enhance peer-reviewed, merit-*  
4        *based, competitive grant funding relating to harmful*  
5        *algal blooms and hypoxia to—*

6                *“(A) maintain and enhance baseline moni-*  
7        *toring programs established by the Program;*

8                *“(B) support the projects maintained and*  
9        *established by the Program;*

10               *“(C) address the research and management*  
11        *needs and priorities identified in the Action*  
12        *Strategy under section 603(c);*

13               *“(D) accelerate the utilization of effective*  
14        *methods of intervention and mitigation to reduce*  
15        *the frequency, severity, and impacts of harmful*  
16        *algal bloom and hypoxia events;*

17               *“(E) identify opportunities to improve*  
18        *monitoring of harmful algal bloom and hypoxia,*  
19        *with a particular focus on coastal waters that*  
20        *may affect fisheries, public health, or subsistence*  
21        *harvest;*

22               *“(F) examine the effects of other environ-*  
23        *mental stressors on harmful algal blooms and*  
24        *hypoxia;*

1           “(G) assess the effects of multiple environ-  
2           mental stressors on living marine resources and  
3           coastal ecosystems; and

4           “(H) evaluate adaptation and mitigation  
5           strategies to address the impacts of harmful algal  
6           blooms and hypoxia;

7           “(4) enhance communication and coordination  
8           among Federal agencies carrying out marine and  
9           freshwater harmful algal bloom and hypoxia activities  
10          and research;

11          “(5) to the greatest extent practicable, leverage  
12          existing resources and expertise available from local  
13          research universities and institutions; and

14          “(6) use cost effective methods in carrying out  
15          this section.

16          “(b) INTEGRATED COASTAL AND OCEAN OBSERVATION  
17          SYSTEM.—The collection of monitoring and observing data  
18          under this section shall comply with all data standards and  
19          protocols developed pursuant to the Integrated Coastal and  
20          Ocean Observation System Act of 2009 (33 U.S.C. 3601 et  
21          seq.). Such data shall be made available through the system  
22          established under that Act.”.

23          (2) CLERICAL AMENDMENT.—The table of con-  
24          tents in section 2 of the Coast Guard Authorization

1       *Act of 1998 is amended by amending the item relat-*  
2       *ing to section 603B to read as follows:*

      “*Sec. 603B. National Oceanic and Atmospheric Administration activities.*”.

3       *(e) ENVIRONMENTAL PROTECTION AGENCY ACTIVI-*  
4       *TIES.—*

5               *(1) IN GENERAL.—The Harmful Algal Bloom*  
6       *and Hypoxia Research and Control Act of 1998 is*  
7       *amended by inserting after section 603B, as amended*  
8       *by subsection (d), the following new section:*

9       “**SEC. 603C. ENVIRONMENTAL PROTECTION AGENCY AC-**  
10               **TIVITIES.**”

11       “*The Administrator shall—*

12               “*(1) carry out research on the ecology and*  
13       *human health impacts of freshwater harmful algal*  
14       *blooms;*

15               “*(2) develop and maintain forecasting and mon-*  
16       *itoring of, and event response to, freshwater harmful*  
17       *algal blooms in lakes, reservoirs, rivers, and estuaries*  
18       *(including tributaries thereof);*

19               “*(3) enhance communication and coordination*  
20       *among Federal agencies carrying out freshwater*  
21       *harmful algal bloom and hypoxia activities and re-*  
22       *search;*

23               “*(4) to the greatest extent practicable, leverage*  
24       *existing resources and expertise available from local*  
25       *research universities and institutions; and*

1           “(5) use cost effective methods in carrying out  
2           this section.”.

3           (2) *CLERICAL AMENDMENT.*—*The table of con-*  
4           *tents in section 2 of the Coast Guard Authorization*  
5           *Act of 1998 is amended by inserting after the item re-*  
6           *lating to section 603B, as amended by subsection (e),*  
7           *the following new item:*

          “*Sec. 603C. Environmental Protection Agency activities.*”.

8           (f) *NATIONAL HARMFUL ALGAL BLOOM AND HYPOXIA*  
9           *OBSERVING NETWORK.*—

10           (1) *IN GENERAL.*—*The Harmful Algal Bloom*  
11           *and Hypoxia Research and Control Act of 1998 is*  
12           *amended by amending section 606 (33 U.S.C. 4005)*  
13           *to read as follows:*

14           “**SEC. 606. NATIONAL HARMFUL ALGAL BLOOM OBSERVING**  
15                                   **NETWORK.**

16           “(a) *IN GENERAL.*—*The Under Secretary, acting*  
17           *through the National Centers for Coastal Ocean Science*  
18           *(NCCOS) and the Integrated Ocean Observing System*  
19           *(IOOS) of the National Oceanic and Atmospheric Adminis-*  
20           *tration, shall integrate Federal, State, regional, and local*  
21           *observing capabilities to establish a national network of*  
22           *harmful algal bloom observing systems for the monitoring,*  
23           *detection, and forecasting of harmful algal blooms by*  
24           *leveraging the capacity of IOOS regional associations, in-*  
25           *cluding through the incorporation of emerging technologies*

1 *and new data integration methods, such as artificial intel-*  
2 *ligence.*

3 “(b) *COORDINATION.*— *In carrying out subsection (a),*  
4 *the IOOS Program Office shall—*

5 “(1) *coordinate with NCCOS regarding observa-*  
6 *tions, data integration, and information dissemina-*  
7 *tion; and*

8 “(2) *establish a Harmful Algal Bloom Data As-*  
9 *sembly Center to integrate, disseminate, and provide*  
10 *a central architecture to support ecological fore-*  
11 *casting.”.*

12 (2) *CLERICAL AMENDMENT.*—*The table of con-*  
13 *tents in section 2 of the Coast Guard Authorization*  
14 *Act of 1998 is amended by amending the item relat-*  
15 *ing to section 606 to read as follows:*

*“Sec. 606. National harmful algal bloom observing network.”.*

16 (g) *DEFINITIONS.*—*Section 609 of the Harmful Algal*  
17 *Bloom and Hypoxia Research and Control Act of 1998 (33*  
18 *U.S.C. 4008) is amended—*

19 (1) *in paragraph (1), by striking “means the*  
20 *comprehensive research plan and action strategy es-*  
21 *tablished under section 603B” and inserting “means*  
22 *the action strategy, including scientific assessment,*  
23 *for marine and freshwater harmful algal blooms es-*  
24 *tablished under section 603(c)”;*

1           (2) *by amending paragraph (3) to read as fol-*  
2 *lows:*

3           “(3) *APPROPRIATE FEDERAL OFFICIAL.*—*The*  
4 *term ‘appropriate Federal official’ means—*

5                     “(A) *in the case of marine systems or Great*  
6 *Lakes hypoxia or harmful algal bloom event, in-*  
7 *cluding those in estuarine areas, the Under Sec-*  
8 *retary of Commerce for Oceans and Atmosphere;*  
9 *and*

10                    “(B) *in the case of a freshwater hypoxia or*  
11 *harmful algal bloom event, the Administrator of*  
12 *the Environmental Protection Agency, in con-*  
13 *sultation with the Under Secretary of Commerce*  
14 *for Oceans and Atmosphere.”.*

15           (3) *by striking paragraph (9);*

16           (4) *by redesignating paragraphs (4), (5), (6),*  
17 *(7), and (8) as paragraphs (6), (7), (9), (10), and*  
18 *(11);*

19           (5) *by inserting after paragraph (3) the fol-*  
20 *lowing new paragraphs:*

21                     “(4) *HARMFUL ALGAL BLOOM; HARMFUL ALGAL*  
22 *BLOOM AND HYPOXIA EVENT.*—

23                     “(A) *HARMFUL ALGAL BLOOM.*—*The term*  
24 *‘harmful algal bloom’ means marine or fresh-*  
25 *water algae or macroalgae, including*

1           *Sargassum*, that proliferate to high concentra-  
2           tions, resulting in nuisance conditions or harm-  
3           ful impacts on marine and freshwater eco-  
4           systems, communities, or human health through  
5           the production of toxic compounds or other bio-  
6           logical, chemical, or physical impacts of the  
7           algae outbreak.

8           “(B) *HARMFUL ALGAL BLOOM AND HYPOXIA*  
9           *EVENT.*—The term ‘harmful algal bloom and hy-  
10          poxia event’ means the occurrence of a harmful  
11          algal bloom or hypoxia as a result of a natural,  
12          anthropogenic, or undetermined cause.

13          “(5) *HARMFUL ALGAL BLOOM OR HYPOXIA*  
14          *EVENT OF SIGNIFICANCE.*—The term ‘harmful algal  
15          bloom or hypoxia event of significance’ means a  
16          harmful algal bloom or hypoxia event that has had or  
17          will likely have significant detrimental environ-  
18          mental, economic, social, subsistence use, or public  
19          health impacts.”;

20          (6) in paragraph (6), as so redesignated—

21                  (A) by striking “aquatic” and inserting  
22                  “marine or freshwater”; and

23                  (B) by striking “resident” and inserting  
24                  “marine or freshwater”; and

1           (7) by inserting after paragraph (7), as so redesi-  
2           gnated, the following new paragraph:

3           “(8) *SUBSISTENCE USE.*—The term ‘subsistence  
4           use’ means the customary and traditional use of fish,  
5           wildlife, or other freshwater, coastal, or marine re-  
6           sources by any individual or community to meet per-  
7           sonal or family needs, including essential economic,  
8           nutritional, or cultural applications.”.

9           (h) *AUTHORIZATION OF APPROPRIATIONS.*—Section  
10          610 of the *Harmful Algal Bloom and Hypoxia Research*  
11          *and Control Act of 1998 (33 U.S.C. 4009)* is amended—

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

14           “(a) *IN GENERAL.*—There is authorized to be appro-  
15          priated to the Under Secretary to carry out this title  
16          \$27,500,000 for each of fiscal years 2024 through 2028.”;  
17          and

18           (2) by adding at the end the following new sub-  
19          section:

20           “(c) *TRANSFER AUTHORITY.*—The Under Secretary is  
21          authorized to make a direct non-expenditure transfer of  
22          funds authorized to be appropriated pursuant to subsection  
23          (a) to the head of any Federal department or agency, with  
24          the concurrence of such head, to carry out, as appropriate,  
25          relevant provisions of this title.”.

1       (i) *NATIONAL LEVEL INCUBATOR PROGRAM.*—

2             (1) *IN GENERAL.*—*The Harmful Algal Bloom*  
3       *and Hypoxia Research and Control Act of 1998 is*  
4       *amended by adding at the end the following new sec-*  
5       *tion:*

6       **“SEC. 611. NATIONAL LEVEL INCUBATOR PROGRAM.**

7             “(a) *IN GENERAL.*—*The Under Secretary, in collabo-*  
8       *ration with research universities and institutions, shall es-*  
9       *tablish a national level incubator program to increase the*  
10       *number of available control strategies and technologies re-*  
11       *lating to harmful algal blooms. Such incubator shall estab-*  
12       *lish a framework for preliminary assessments of novel*  
13       *harmful algal bloom prevention, mitigation, and control*  
14       *technologies in order to determine the potential for effective-*  
15       *ness and scalability.*

16            “(b) *OPERATION.*—*The incubator under subsection (a)*  
17       *shall provide merit-based funding for harmful algal bloom*  
18       *control strategies and technologies that eliminate or reduce*  
19       *through biological, chemical, or physical means the levels*  
20       *of harmful algae and associated toxins.*

21            “(c) *DATABASE.*—*The incubator under subsection (a)*  
22       *shall include a database to catalog the licensing and permit-*  
23       *ting requirements, economic costs, feasibility, effectiveness,*  
24       *and scalability of both novel and established prevention,*  
25       *control, and mitigation measures.*

1           “(d) *PRIORITIZATION.*—*In carrying out the incubator*  
2 *under subsection (a), the Under Secretary shall prioritize*  
3 *proposed activities that would, to the maximum extent*  
4 *practicable—*

5                   “(1) *protect key habitats for fish and wildlife;*

6                   “(2) *maintain biodiversity;*

7                   “(3) *protect public health;*

8                   “(4) *protect coastal resources of national, histor-*  
9 *ical, and cultural significance; or*

10                   “(5) *seek to partially or fully benefit commu-*  
11 *nities of color, low-income communities, Indian*  
12 *Tribes or Indigenous communities, and rural commu-*  
13 *nities.”.*

14                   “(2) *CLERICAL AMENDMENTS.*—*The table of con-*  
15 *tents in section 2 of the Coast Guard Authorization*  
16 *Act of 1998 is amended by inserting after the item re-*  
17 *lating to section 610 the following new item:*

                  “*Sec. 611. National level incubator program.*”.

18                   “(j) *HARMFUL ALGAL BLOOM OR HYPOXIA EVENT OF*  
19 *SIGNIFICANCE.*—*Subsection (g) of section 9 of the National*  
20 *Integrated Drought Information System Reauthorization*  
21 *Act of 2018 (33 U.S.C. 4010) is amended—*

22                   “(1) *in paragraph (1)—*

23                           “(A) *in subparagraph (B), by adding at the*  
24 *end the following new sentence: “The appropriate*  
25 *Federal official may waive the non-Federal share*

1           *requirements of this subsection if such official de-*  
2           *termines no reasonable means are available*  
3           *through which the recipient of the Federal share*  
4           *can meet the non-Federal share requirement.”;*  
5           *and*

6                     *(B) by adding at the end the following new*  
7           *subparagraph:*

8                     *“(D) CONTRACT, GRANT, AND COOPERATIVE*  
9           *AGREEMENT AUTHORITY.—The Under Secretary*  
10          *may enter into agreements and grants with*  
11          *States, Indian Tribes, local governments, or*  
12          *other entities to pay for or reimburse costs in-*  
13          *curring for the purposes of supporting the deter-*  
14          *mination of and assessing the environmental,*  
15          *economic, social, subsistence use, and public*  
16          *health effects of a harmful algal bloom or hy-*  
17          *poxia event of significance.”;*

18                    *(2) in paragraph (2)(A), by inserting “, leader-*  
19          *ship official of an affected Indian Tribe, the executive*  
20          *official of the District of Columbia, or a territory or*  
21          *possession of the United States, including Puerto*  
22          *Rico, the Virgin Islands, Guam, the Commonwealth of*  
23          *the Northern Mariana Islands, and the Trust Terri-*  
24          *tories of the Pacific Islands, and American Samoa, if*  
25          *affected” after “State”; and*

1           (3) by adding at the end the following new para-  
2 graph:

3           “(4) *FUNDING AUTHORITY.*—To carry out this  
4 subsection, notwithstanding any other provision of  
5 law, there is authorized to be appropriated from the  
6 amounts made available to the Under Secretary  
7 \$2,000,000, to remain available until expended.”.

8           (k) *PROTECT FAMILIES FROM TOXIC ALGAL*  
9 *BLOOMS.*—Section 128 of the Water Resources Development  
10 Act of 2020 (33 U.S.C. 610 note) is amended—

11           (1) by redesignating subsection (e) as subsection  
12 (f); and

13           (2) by inserting after subsection (d) the following  
14 new subsection:

15           “(e) *HARMFUL ALGAL BLOOM TECHNOLOGIES.*—In  
16 carrying out the demonstration program under subsection  
17 (a), the Secretary may enter into agreements with water  
18 and irrigation districts located in the focus areas described  
19 in subsections (c) and (d) for the use or sale of any new  
20 technologies developed under the program to expedite the re-  
21 moval of harmful algal blooms in such areas.”.

1 **TITLE II—ENHANCING FEDERAL**  
2 **WEATHER FORECASTING AND**  
3 **INNOVATION**

4 **SEC. 201. WEATHER INNOVATION FOR THE NEXT GENERA-**  
5 **TION.**

6 (a) *IN GENERAL.*—Not later than 180 days after the  
7 date of the enactment of this Act, the Under Secretary shall  
8 establish a Research, Development, Test, and Evaluation  
9 Program (in this section referred to as the “Program”) to  
10 ensure the continued performance of weather radar capa-  
11 bilities, including systems currently being developed, with  
12 interferences in the line of sight of such radar.

13 (b) *REQUIREMENTS.*—In carrying out the Program,  
14 the Under Secretary, in consultation with the Interagency  
15 Council for Advancing Meteorological Services, shall—

16 (1) partner with the private sector, academia,  
17 Federal, State, and local government entities, and  
18 any other entity the Under Secretary considers appro-  
19 priate;

20 (2) identify, evaluate, and test existing or near-  
21 commercial technologies and solutions that improve  
22 radar coverage and performance, including by miti-  
23 gating the potential impact of interferences on weath-  
24 er radar;

1           (3) *to the maximum extent practicable, research*  
2 *additional solutions that could mitigate the effects of*  
3 *interferences on weather radar, such as—*

4                   (A) *signal processing algorithms;*

5                   (B) *short-term forecasting algorithms to re-*  
6 *place contaminated data;*

7                   (C) *the use of dual polarization characteris-*  
8 *tics in mitigating the effects of wind turbines on*  
9 *weather radar; and*

10                  (D) *gap filling radars to provide supple-*  
11 *mental or replacement observations in impacted*  
12 *areas; and*

13           (4) *develop, support, or partner with developers*  
14 *to provide commercially viable technical mitigation*  
15 *solutions for interferences to weather radar capabili-*  
16 *ties that are compatible with the operational require-*  
17 *ments of the weather radar systems.*

18           (c) *PRIORITY.—In carrying out subsection (b), the*  
19 *Under Secretary shall prioritize consideration of the fol-*  
20 *lowing technology-based mitigation solutions:*

21                   (1) *Phased array weather radar systems.*

22                   (2) *Supplementing or replacing contaminated*  
23 *data with commercial radar data.*

1           (3) *The utilization of data from private sector*  
2 *associated meteorological towers or similar capabili-*  
3 *ties.*

4           (4) *The display on local forecasting equipment of*  
5 *wind farm boundaries and consolidated wind farm*  
6 *areas.*

7           (5) *The installation and provision of access to*  
8 *rain gauges.*

9           (6) *Any other technology-based mitigation solu-*  
10 *tion the Under Secretary determines could improve*  
11 *radar coverage by overcoming interferences, beam*  
12 *blockage, or ghost echoes.*

13       (d) *REPORT; RECOMMENDATION.—*

14           (1) *IN GENERAL.—Not later than two years after*  
15 *the date of the enactment of this section and annually*  
16 *thereafter until the Program terminates pursuant to*  
17 *subsection (e), the Under Secretary shall submit to*  
18 *Congress a report on the implementation of the Pro-*  
19 *gram, including an evaluation of each technology-*  
20 *based mitigation solution identified for priority con-*  
21 *sideration pursuant to subsection (c), and a rec-*  
22 *ommendation regarding additional identification and*  
23 *testing of new technologies based on such consider-*  
24 *ation.*

1           (2) *FINAL RECOMMENDATION.*—Not later than  
2     *five years after the date of the enactment of this sec-*  
3     *tion, the Under Secretary shall provide to Congress a*  
4     *recommendation on whether additional research, test-*  
5     *ing, and development through the Program established*  
6     *under subsection (a) is needed, and a determination*  
7     *of whether a cessation of field research, testing, devel-*  
8     *opment and evaluation is appropriate.*

9           (e) *TERMINATION.*—The authority of the Under Sec-  
10  *retary to carry out the Program shall terminate on the ear-*  
11  *lier of—*

12           (1) *September 30, 2029; or*

13           (2) *one year after the date on which the final*  
14     *recommendation required under subsection (d)(2) is*  
15     *submitted by the Under Secretary.*

16           (f) *DEFINITIONS.*—In this section:

17           (1) *BEAM BLOCKAGE.*—The term “beam block-  
18     *age” means a signal that is partially or fully blocked*  
19     *due to an interference.*

20           (2) *GHOST ECHO.*—The term “ghost echo” means  
21     *radar signal reflectivity or velocity return errors in*  
22     *radar data due to the proximity of an interference.*

23           (3) *INTERFERENCE.*—The term “interference”  
24     *includes the following:*

1           (A) a wind turbine that could limit the ef-  
2           fectiveness of a weather radar system;

3           (B) any building that disrupts or limits the  
4           effectiveness of a weather radar system; or

5           (C) any other natural or human built struc-  
6           ture that affects a weather radar system.

7 **SEC. 202. NEXT GENERATION RADAR.**

8           (a) *IN GENERAL.*—The Under Secretary shall develop  
9 a plan to replace the Next Generation Weather Radar of  
10 the National Weather Service (“NEXRAD”) system in ex-  
11 istence as of the date of the enactment of this section.

12          (b) *PROCUREMENT DEADLINE.*—The Under Secretary  
13 shall take such actions as may be necessary to ensure the  
14 replacement described in subsection (a) is completed by not  
15 later than September 30, 2040.

16          (c) *ELEMENTS.*—The plan developed pursuant to sub-  
17 section (a) shall include the following:

18           (1) *Estimates of quantifiable improvements in*  
19 *radar performance and service delivery, including*  
20 *coverage and accuracy, to be made from replacement*  
21 *of the NEXRAD system referred to in such subsection.*

22           (2) *Development of a digital phased array radar*  
23 *test article designed to test and determine the speci-*  
24 *fications and requirements for such replacement.*

1           (3) *Establishment of a weather surveillance*  
2 *radar testbed for the following:*

3           (A) *Evaluation of commercial radars with*  
4 *the potential to replace or supplement the*  
5 *NEXRAD system.*

6           (B) *Providing technical assistance for com-*  
7 *mercial replacement or supplemental radars, in-*  
8 *cluding data void filling radars in regions where*  
9 *geographical topography prevents full utilization*  
10 *of conventional systems.*

11          (4) *Consultation and input solicited from mete-*  
12 *orologists, emergency managers, and public safety of-*  
13 *ficials regarding the specifications and requirements*  
14 *for the replacement of the NEXRAD system referred*  
15 *in such subsection.*

16          (5) *Prioritized locations for initial deployment*  
17 *of the replacement system described in subsection (a)*  
18 *that will replace the NEXRAD system.*

19          (6) *Expected locations of such replacement sys-*  
20 *tem described in subsection (a), including sites located*  
21 *more than 75 miles away from an existing NEXRAD*  
22 *station and additional appropriate locations.*

23          (d) *RADAR-AS-A-SERVICE.—*

24           (1) *IN GENERAL.—In order to supplement data*  
25 *voids in radar coverage in existence as of the date of*

1        *the enactment of this section and ensure the continued*  
2        *performance of weather radar capabilities, the Under*  
3        *Secretary may utilize and contract with third party*  
4        *entities to fill such low-level and wide-area radar*  
5        *data voids using diverse weather radars and data as-*  
6        *similation technologies to better detect significant pre-*  
7        *cipitation and severe weather over a greater area*  
8        *across the population.*

9            (2) *CONSIDERATIONS.—In carrying out the ac-*  
10        *tivities under paragraph (1), the Under Secretary*  
11        *may consider—*

12            (A) *utilizing and contracting with third-*  
13        *party entities that have participated in the*  
14        *testbed established in accordance with subsection*  
15        *(c)(3), the National Mesonet Program, or Cooper-*  
16        *ative Research and Development Agreements;*  
17        *and*

18            (B) *weather camera systems and services,*  
19        *including systems and services in consultation*  
20        *with the Federal Aviation Administration, as*  
21        *viable technologies to supplement weather fore-*  
22        *casting and prediction needs.*

23            (e) *UPDATES TO CONGRESS.—The Under Secretary*  
24        *shall provide to the Committee on Science, Space, and Tech-*  
25        *nology of the House of Representatives and the Committee*

1 *on Commerce, Science, and Transportation of the Senate*  
2 *periodic updates on the implementation of this section.*

3 **SEC. 203. DATA VOIDS IN HIGHLY VULNERABLE AREAS OF**  
4 **THE UNITED STATES.**

5 *(a) IN GENERAL.—The Under Secretary, in coordina-*  
6 *tion with the Director of the National Weather Service and*  
7 *the Administrator of the Federal Emergency Management*  
8 *Agency, in consultation with the United States weather in-*  
9 *dustry, academic partners, and in accordance with activi-*  
10 *ties implemented through existing regional atmospheric,*  
11 *coastal, ocean, and Great Lakes observing systems, shall*  
12 *carry out activities to ensure equitable and comprehensive*  
13 *weather observation coverage and emergency information*  
14 *sharing in the United States, including relating to the fol-*  
15 *lowing:*

16 *(1) Reviewing areas in the continental United*  
17 *States and the territories that are considered under-*  
18 *observed, underserved, or highly vulnerable for weath-*  
19 *er phenomenon, including urban and offshore regions,*  
20 *and identifying associated challenges to providing*  
21 *such coverage.*

22 *(2) Increasing weather observations and devel-*  
23 *oping new weather observational capabilities, such as*  
24 *urban heat island mapping campaigns, with respect*

1       to under-observed, underserved, or highly vulnerable  
2       regions.

3               (3) *Establishing or supporting testbeds to develop*  
4       *and integrate new weather, water, and climate obser-*  
5       *vation or emergency information sharing tools, such*  
6       *as next generational or supplemental radars for*  
7       *weather observations, in under-observed, underserved,*  
8       *or highly vulnerable regions.*

9               (4) *To the maximum extent practicable, advanc-*  
10       *ing weather and water forecasting and climate mod-*  
11       *eling capabilities for under-observed, underserved, or*  
12       *highly vulnerable regions.*

13              (5) *Undertaking workforce development efforts*  
14       *for emergency management officials and meteorolo-*  
15       *gists in under-observed, underserved, or highly vulner-*  
16       *able areas, including urban regions, of the United*  
17       *States.*

18              (6) *Using data void filling observations to better*  
19       *resolve extreme rainfall in complex topography.*

20              (7) *Contributing to a national integrated heat*  
21       *health information systems.*

22       (b) *PILOT PROGRAM.*—*In carrying out this section, the*  
23       *Under Secretary, acting through the Director of the Na-*  
24       *tional Weather Service and the Administrator of the Fed-*  
25       *eral Emergency Management Agency, shall establish an*

1 *interagency partnership to support pilot projects that accel-*  
2 *erate coordination and use of localized weather, water, and*  
3 *climate data and impact-based communications in infra-*  
4 *structure and emergency management decisions by Federal,*  
5 *State, and local officials.*

6 (c) *PRIORITY.*—*At least one pilot project under sub-*  
7 *section (b) shall address key science challenges to using*  
8 *mesonet data in local decision making and development of*  
9 *new tools and training for owners and operators of critical*  
10 *infrastructure (as such term is defined in section 1016(e)*  
11 *of Public Law 107–56 (42 U.S.C. 5195c(e))), such as dams,*  
12 *energy generation and distribution facilities, nuclear power*  
13 *plants, and transportation networks.*

14 **SEC. 204. ATMOSPHERIC RIVERS FORECAST IMPROVEMENT**  
15 **PROGRAM.**

16 (a) *IN GENERAL.*—*The Under Secretary, in collabora-*  
17 *tion with the United States weather industry and academic*  
18 *partners, shall establish an atmospheric river forecast im-*  
19 *provement program (in this section referred to as the “pro-*  
20 *gram”).*

21 (b) *GOAL.*—*The goal of the program shall be to reduce*  
22 *through the development and extension of accurate, effective,*  
23 *and actionable forecasts and warnings the loss of life or*  
24 *property from atmospheric rivers, including by—*

1           (1) *establishing quantitative atmospheric river*  
2 *forecast skill metrics that include quantifying the ben-*  
3 *efits of dynamical modeling, data assimilation, and*  
4 *machine learning improvements in the probabilistic*  
5 *forecasts of landfall location, extreme wind and pre-*  
6 *cipitation, and cascading impacts;*

7           (2) *developing an atmospheric river forecast sys-*  
8 *tem within the unified forecast system, and advanc-*  
9 *ing next-generation coupled modeling systems, with*  
10 *the capability of providing seasonal to short-range at-*  
11 *mospheric river forecasts that include forecast of snow*  
12 *accumulation and other hydrologic components;*

13           (3) *advancing scientific understanding of the*  
14 *roles of atmospheric rivers in subseasonal to seasonal*  
15 *precipitation and probabilistic predictions at subsea-*  
16 *sonal and seasonal scales;*

17           (4) *developing tools and improved forecast prod-*  
18 *ucts to predict periods of active or inactive atmos-*  
19 *pheric river landfalls and inland penetration over the*  
20 *western United States with a focus on addressing*  
21 *stakeholder and public needs related to perceiving,*  
22 *comprehending, and responding to atmospheric river*  
23 *forecast improvements; and*

24           (5) *enhancing research transition to operations*  
25 *through the Administration’s testbeds, including the*

1        *evaluation of physical and social science, technology,*  
2        *and other research to develop products and services*  
3        *for implementation and use by relevant stakeholders.*

4        *(c) INNOVATIVE OBSERVATIONS AND MODELING.—The*  
5        *Under Secretary shall ensure the program periodically ex-*  
6        *amines, tests, and evaluates the value of incorporating in-*  
7        *novative observations, such as novel sensor technologies, ob-*  
8        *servaion networks, soil moisture monitoring systems, res-*  
9        *ervoir storage data, observations from crewed or uncrewed*  
10       *systems, and hosted instruments on commercial aircrafts,*  
11       *vessels, and satellites, and data assimilation tools, with re-*  
12       *spect to the improvement of atmospheric river forecasts, pre-*  
13       *dictions, and warnings.*

14       *(d) PROGRAM PLAN.—Not later than 180 days after*  
15       *the date of the enactment of this Act, the Under Secretary*  
16       *shall develop a plan that details the specific research, devel-*  
17       *opment, data acquisition, and technology transfer activi-*  
18       *ties, as well as corresponding resources, limitations, and*  
19       *timelines, necessary to achieve the goal of the program*  
20       *under subsection (b).*

21       *(e) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After*  
22       *the development of the plan pursuant to subsection (d), the*  
23       *Under Secretary shall, not less frequently than annually,*  
24       *submit to Congress a proposed budget corresponding with*  
25       *the activities identified in such plan.*

1 **SEC. 205. COASTAL FLOODING AND STORM SURGE FORE-**  
2 **CAST IMPROVEMENT PROGRAM.**

3 (a) *IN GENERAL.*—*The Under Secretary, in collabora-*  
4 *tion with the Integrated Ocean Observing System, the*  
5 *United States weather industry, and academic partners,*  
6 *shall establish a coastal flooding and storm surge forecast*  
7 *improvement program (in this section referred to as the*  
8 *“program”).*

9 (b) *GOAL.*—*The goal of the program shall be to reduce*  
10 *through the development and extension of accurate, effective,*  
11 *actionable, and probable forecasts and warnings the loss of*  
12 *life or property from coastal flooding, including high tide*  
13 *flooding, and storm surge events.*

14 (c) *PRIORITY.*—*In implementing the program, the*  
15 *Under Secretary shall prioritize activities that carry out*  
16 *the following:*

17 (1) *Improving understanding and capacity for*  
18 *real-time operational prediction of the ocean’s role in*  
19 *coastal flooding, including high tide flooding, and*  
20 *storm surge events.*

21 (2) *Improving the capacity to mitigate or pre-*  
22 *vent the impacts of coastal flooding, including high*  
23 *tide flooding, and storm surge events, including by*  
24 *improving the understanding and capacity of coastal*  
25 *communities to perceive, comprehend, and respond to*  
26 *forecast information.*

1           (3) *Incorporating data from in situ distributed*  
2           *sensors into models.*

3           (4) *Developing probabilistic coastal flooding, in-*  
4           *cluding high tide flooding, and storm surge estimates*  
5           *to complement worst-case scenario estimates, includ-*  
6           *ing for use in long-term planning and risk manage-*  
7           *ment by States, Tribal governments, localities, and*  
8           *emergency managers in coordination with the Federal*  
9           *Emergency Management Agency, as appropriate.*

10          (5) *Establishing skill metrics for coastal inunda-*  
11          *tion forecasting that quantify the benefits of dynam-*  
12          *ical modeling, data assimilation, and machine learn-*  
13          *ing improvements in the probabilistic forecast of*  
14          *coastal flooding, including high tide flooding, and*  
15          *storm surge risk and impacts.*

16          (6) *Improving operational regional storm surge*  
17          *and wave prediction models to enhance probabilistic*  
18          *guidance and messaging.*

19          (d) *INNOVATIVE OBSERVATIONS AND MODELING.—The*  
20          *Under Secretary shall ensure the program periodically ex-*  
21          *amines, tests, and evaluates the value of incorporating en-*  
22          *hanced model physics, hybrid dynamical or machine learn-*  
23          *ing based prediction systems, and innovative observations,*  
24          *such as novel sensor technologies, observation networks,*  
25          *crewed or uncrewed systems, and hosted instruments on*

1 *commercial aircrafts, vessels, and satellites, with respect to*  
2 *the improvement of coastal flooding, including high tide*  
3 *flooding, and storm surge forecasts, predictions, and warn-*  
4 *ings.*

5 *(e) PROGRAM PLAN.—Not later than 180 days after*  
6 *the date of the enactment of this Act, the Under Secretary*  
7 *shall develop a plan that details the specific research, devel-*  
8 *opment, data acquisition, and technology transfer activi-*  
9 *ties, as well as corresponding resources and timelines, nec-*  
10 *essary to achieve the goal of the program under subsection*  
11 *(b).*

12 *(f) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After*  
13 *the development of the plan pursuant to subsection (e), the*  
14 *Under Secretary shall, not less frequently than annually,*  
15 *submit to Congress a proposed budget corresponding with*  
16 *the activities identified in such plan.*

17 **SEC. 206. AVIATION WEATHER AND DATA INNOVATION.**

18 *(a) PROGRAM.—The Under Secretary shall maintain*  
19 *an airborne observation program (in this section referred*  
20 *to as the “program”) for the acquisition of atmospheric sen-*  
21 *sor data and the deployment of critical atmospheric sensors,*  
22 *including in partnership with the weather enterprise.*

23 *(b) ACTIVITIES.—The program shall include activities*  
24 *that carry out the following:*

1           (1) *Procurement of weather data available from*  
2           *commercial aircraft, as determined by the Under Sec-*  
3           *retary.*

4           (2) *Acquisition of additional vertical profile ob-*  
5           *servations that provide spatial and temporal density,*  
6           *as determined by the Under Secretary.*

7           (3) *Analysis of procured data when incorporated*  
8           *into the National Oceanic and Atmospheric Adminis-*  
9           *tration’s unified forecast system in order to provide*  
10          *improved forecast information for aircraft.*

11          (c) *BUDGET.—The Under Secretary shall, not less fre-*  
12          *quently than annually, submit to Congress a proposed*  
13          *budget corresponding with the activities described in sub-*  
14          *section (b), including and analysis of activities that can*  
15          *be complemented by National Oceanic and Atmospheric Ad-*  
16          *ministration aircraft.*

17          (d) *AUTHORIZATION OF APPROPRIATIONS.—From*  
18          *amounts made available to the Commercial Data Program*  
19          *under section 302 of the Weather Research and Forecasting*  
20          *Innovation Act of 2017, there is authorized to be appro-*  
21          *priated up to \$10,000,000 for each of fiscal years 2024*  
22          *through 2028 to carry out the program.*

23          (e) *AVIATION WEATHER AND TURBULENCE FORE-*  
24          *CASTING.—The Director of the National Weather Service*  
25          *shall include turbulence events, icing conditions, or other*

1 *phenomena in the forecasting capabilities of the National*  
2 *Weather Service's Aviation Weather Center, and deliver*  
3 *operational forecasts with consistent, timely, and accurate*  
4 *weather and turbulence information for the airspace system*  
5 *and the protection of lives and property.*

6 (f) *COORDINATION.—In carrying out subsection (e),*  
7 *the Director of the National Weather Service shall give con-*  
8 *sideration to recommendations from the Administrator of*  
9 *the Federal Aviation Administration in furtherance of sec-*  
10 *tion 44720 of title 49, United States Code, and improve*  
11 *weather and turbulence forecasting capabilities by—*

12 (1) *designating or establishing within the Fed-*  
13 *eral Government an interagency working group to de-*  
14 *termine weather and environmental data or observa-*  
15 *tion requirements, needs, and potential solutions re-*  
16 *lated to aviation weather and turbulence modeling or*  
17 *forecasting;*

18 (2) *identifying current and future potential data*  
19 *gaps related to turbulence events or phenomena that*  
20 *can—*

21 (A) *identify or inform route specific flight*  
22 *planning; and*

23 (B) *be supplemented or filled by commercial*  
24 *aviation tools;*

1           (3) *transitioning research initiatives and pilot*  
2           *programs, including a pilot program of instrumenta-*  
3           *tion for observing greenhouse gases and other atmos-*  
4           *pheric factors deployed on commercial aircraft and*  
5           *supporting the evaluation of a sustained observing*  
6           *network using such platforms, into operations that*  
7           *improve the forecasting missions of the Aviation*  
8           *Weather Center;*

9           (4) *developing and deploying improved prob-*  
10          *abilistic aviation weather forecast guidance tech-*  
11          *nology; and*

12          (5) *updating interagency agreements as appro-*  
13          *priate, including to address reimbursable agreements.*

14          (g) *NEXT GENERATION AVIATION RESEARCH.—Para-*  
15          *graph (3) of section 102(b) of the Weather Research and*  
16          *Forecasting Innovation Act of 2017 (15 U.S.C. 8512(b)),*  
17          *is amended—*

18                 (1) *by redesignating subparagraphs (F) and (G)*  
19                 *as subparagraphs (G) and (H), respectively; and*

20                 (2) *by inserting after subparagraph (E) the fol-*  
21                 *lowing new subparagraph:*

22                         “(F) *aviation weather phenomena, includ-*  
23                         *ing atmospheric composition and turbulence, to*  
24                         *improve scientific understanding and forecast*  
25                         *capabilities for the airspace system;”.*

1           (h) *AVIATION INFORMATION DISSEMINATION.*—The  
2 *Under Secretary shall ensure the Aviation Weather Center*  
3 *is able, to the maximum extent possible, to disseminate in*  
4 *a timely manner full resolution aviation weather data, fore-*  
5 *casts, and information to meet the needs of aviation users.*

6 **SEC. 207. NESDIS JOINT VENTURE PARTNERSHIP TRANSI-**  
7 **TION PROGRAM.**

8           (a) *IN GENERAL.*—The Assistant Administrator of the  
9 *National Environmental Satellite, Data, and Information*  
10 *Service, in consultation with the Administrator of the Na-*  
11 *tional Aeronautics and Space Administration, shall admin-*  
12 *ister broad agency announcements and other transactional*  
13 *authority or contracting mechanisms, on an annual or*  
14 *more frequent basis, to support a joint venture partnership*  
15 *program that allows the Service to prioritize engagement*  
16 *with the private sector, academia, and other Federal de-*  
17 *partments and agencies.*

18           (b) *TRANSITION PROGRAM.*—To support the develop-  
19 *ment of next-generation technologies, missions, data sys-*  
20 *tems, spacecraft, and instrument design, the Assistant Ad-*  
21 *ministrator of the National Environmental Satellite, Data,*  
22 *and Information Service, in consultation with the Adminis-*  
23 *trator of the National Aeronautics and Space Administra-*  
24 *tion, shall maintain a program to transition selected*  
25 *awards from research and study phases into demonstration.*

1 *In selecting awardees for demonstrations, the Assistant Ad-*  
2 *ministrator shall consider technologies, missions, data sys-*  
3 *tems, spacecraft, and instrument design that—*

4           (1) *improve upon the National Oceanic and At-*  
5 *mospheric Administration’s satellite architecture;*

6           (2) *have a direct impact on implementing the*  
7 *recommendations of the Administration’s 2018 Sat-*  
8 *ellite Observing System Architecture Study, “Build-*  
9 *ing a Plan for NOAA’s 21st Century Satellite Observ-*  
10 *ing System”;* and

11           (3) *meet current or future mission requirements.*

12       (c) *OPERATIONAL PLANNING.—In carrying out the*  
13 *transition program under subsection (b), the Assistant Ad-*  
14 *ministrator of the National Environmental Satellite, Data,*  
15 *and Information Service shall monitor demonstration phase*  
16 *progress and plan for promising results that meet mission*  
17 *requirements to be transitioned into National Oceanic and*  
18 *Atmospheric Administration’s operational satellite archi-*  
19 *tecture.*

20       (d) *ANNUAL PLAN.—The Assistant Administrator of*  
21 *the National Environmental Satellite, Data, and Informa-*  
22 *tion Service shall submit to the Committee on Science,*  
23 *Space, and Technology, and the Committee on Commerce,*  
24 *Science, and Transportation an annual plan that outlines*  
25 *the progress made in the joint venture partnership program*

1 *under subsection (a), the transition program for demonstra-*  
2 *tions under section (b), and transition to operational archi-*  
3 *ture planning under subsection (c).*

4 *(e) AUTHORIZATION OF APPROPRIATIONS.—From*  
5 *amounts authorized to be appropriated to the National En-*  
6 *vironmental Satellite, Data, and Information Service, there*  
7 *is authorized to be appropriated \$20,000,000 for fiscal*  
8 *years 2024 through 2028 to carry out to this section.*

9 **SEC. 208. ADVANCED WEATHER INTERACTIVE PROCESSING**  
10 **SYSTEM.**

11 *(a) IN GENERAL.—The Under Secretary, acting*  
12 *through the Director of the National Weather Service, shall*  
13 *develop a strategy to transition operations of the Advanced*  
14 *Weather Interactive Processing System to an operational*  
15 *cloud-based environment in order to enable a more nimble,*  
16 *flexible, and mobile workforce.*

17 *(b) SERVICES.—The Under Secretary shall ensure that*  
18 *the Advanced Weather Interactive Processing System in an*  
19 *operational cloud-based environment referred to in sub-*  
20 *section (a) provides impact-based decision support services*  
21 *to emergency managers at the Federal, State, local, and*  
22 *Tribal levels, and continues to provide the following serv-*  
23 *ices:*

24 *(1) Integrating and displaying forecast data, in-*  
25 *cluding meteorological, hydrological, climate, ocean,*

1        *satellite, and radar data, for National Weather Serv-*  
2        *ice field offices and national centers.*

3            (2) *Acquiring and processing observational data*  
4        *from sensors and local sources.*

5            (3) *Providing an interactive communications*  
6        *system, including the satellite broadcast network, to*  
7        *connect relevant National Weather Service employees*  
8        *and sites.*

9            (4) *Initiating the dissemination of weather,*  
10       *water, marine, ecological, climate, aviation, and*  
11       *space warnings and forecasts in a rapid and highly*  
12       *reliable manner.*

13        (c) *ELEMENTS.—The transition strategy developed*  
14       *pursuant to subsection (a) may include the following:*

15            (1) *Establishment or support of testbeds, pilot*  
16        *projects, and functional testing activities to facilitate*  
17        *remote evaluation and automated testing.*

18            (2) *Coordinated training efforts needed for Fed-*  
19        *eral and non-Federal users and operators of the Ad-*  
20        *vanced Weather Interactive Processing System in an*  
21        *operational cloud-based environment referred to in*  
22        *subsection (a).*

23            (3) *Evaluation of bandwidth requirements to*  
24        *achieve a quality user experience.*

1           (4) *Installation of circuits to reduce lapses in*  
2           *network operations and support backup functions.*

3           (5) *Establishment of a cloud-based, remotely ac-*  
4           *cessible repository for data referred to in subsection*  
5           *(b)(2).*

6           (6) *Development and deployment of virtualized*  
7           *systems to replace physical hardware at operational*  
8           *sites.*

9           (7) *Evaluation of commercial cloud providers,*  
10          *including hybrid approaches, to meet mission needs.*

11          (8) *Development, testing, demonstration, evalua-*  
12          *tion, and operationalization of forecast and warning*  
13          *products, consistent with the mission and scientific*  
14          *expertise of the Administration.*

15          (d) *TRANSITION DEADLINE.—The Under Secretary*  
16          *shall take such actions as may be necessary to ensure the*  
17          *transition strategy described in subsection (a) is completed*  
18          *by not later than September 30, 2030.*

19          (e) *UPDATES TO CONGRESS.—The Under Secretary*  
20          *shall submit to the Committee on Science, Space, and Tech-*  
21          *nology of the House of Representatives and the Committee*  
22          *on Commerce, Science, and Transportation of the Senate*  
23          *periodic updates on the implementation of this section.*

24          (f) *CONTINUED INNOVATION.—Nothing in this section*  
25          *may be construed as prohibiting the development of new*

1 *forecast capabilities, sub-systems, or implementing mod-*  
2 *eling advancements on the operational computing systems*  
3 *of the Administration.*

4 **SEC. 209. REANALYSIS AND REFORECASTING.**

5 *The Under Secretary may support reanalysis and re-*  
6 *forecasting activities within the National Oceanic and At-*  
7 *mospheric Administration, including through the hazardous*  
8 *weather testbed of the Administration, for improving weath-*  
9 *er forecasts, extreme weather predictions, and weather and*  
10 *climate datasets.*

11 **SEC. 210. NATIONAL WEATHER SERVICE WORKFORCE.**

12 *(a) HIRING.—The Director of the National Weather*  
13 *Service shall annually submit to the Under Secretary and*  
14 *Congress an assessment of the milestones, timelines, and*  
15 *service level expectations required for the expeditious hiring*  
16 *and timely on-boarding of employees of the National Weath-*  
17 *er Service. Each such assessment may include the following:*

18 *(1) Recommendations to outsource hiring to any*  
19 *entity other than the National Weather Service in*  
20 *order to meet such milestones, timelines, and service*  
21 *level expectations.*

22 *(2) Determinations of the number of staff and*  
23 *designated positions required at each forecasting office*  
24 *to provide services to protect lives and property in the*  
25 *geographic region of responsibility.*

1       (b) *HEALTH AND MORALE ASSESSMENT.*—*The Direc-*  
2 *tor of the National Weather Service shall contract or con-*  
3 *tinue to partner with an entity other than the National*  
4 *Weather Service to conduct an assessment of medical im-*  
5 *pacts, including stress and long-term health impacts, on*  
6 *National Weather Service employees related to required ro-*  
7 *tating shift work. Such assessment may include options for*  
8 *mitigating such impacts on employees and recommenda-*  
9 *tions for improving benefits related to required rotating*  
10 *shift work.*

11       (c) *DESIGNATION OF SERVICE HYDROLOGIST.*—

12           (1) *IN GENERAL.*—*The Director of the National*  
13 *Weather Service may designate at least one service*  
14 *hydrologist at each Weather Forecast Office of the Na-*  
15 *tional Weather Service.*

16           (2) *LIMITATION.*—*Nothing in this section may be*  
17 *construed to authorize or require a change in the au-*  
18 *thorized number of full time equivalent employees of*  
19 *the National Weather Service or otherwise result in*  
20 *the employment of any additional employees.*

21           (3) *PERFORMANCE BY OTHER EMPLOYEES.*—*Not-*  
22 *withstanding paragraphs (4) and (5), the Director of*  
23 *the National Weather Service may assign the per-*  
24 *formance of the responsibilities described in this sub-*

1        *section to such other staff of the National Weather*  
2        *Service as the Director considers appropriate*

3            (4) *RESPONSIBILITIES.*—*In order to increase im-*  
4        *port-based decision support services, each service co-*  
5        *ordination hydrologist designated under paragraph*  
6        *(1) shall, with respect to hydrology, carry out the fol-*  
7        *lowing:*

8            (A) *Be responsible for providing service to*  
9        *the geographic area of responsibility covered by*  
10       *the Weather Forecast Office at which the service*  
11       *coordination hydrologist is employed to help en-*  
12       *sure that users of products and services of the*  
13       *National Weather Service can respond effectively*  
14       *to improve outcomes from flood events.*

15           (B) *Liaise with users of products and serv-*  
16       *ices of the National Oceanic and Atmospheric*  
17       *Administration, such as emergency managers,*  
18       *the public, academia, media outlets, users in the*  
19       *hydropower, transportation, recreation, and ag-*  
20       *ricultural communities, and forestry, land, fish-*  
21       *eries, and water management interests, to evalu-*  
22       *ate the adequacy and usefulness of the products*  
23       *and services referred to in subparagraph (A), in-*  
24       *cluding extended range streamflow forecasts,*  
25       *water supply forecasts, drought outlooks, flood*

1           *inundation mapping, coastal inundation, and*  
2           *flood warnings.*

3           *(C) Collaborate with the National Water*  
4           *Center, River Forecast Centers, other Weather*  
5           *Forecast Offices, the National Integrate Drought*  
6           *Information System, Administration offices, and*  
7           *Federal, State, local, and Tribal government*  
8           *agencies, as the Director considers appropriate,*  
9           *in developing, proposing, and implementing*  
10          *plans to develop, modify, or tailor such products*  
11          *and services to improve the usefulness of such*  
12          *products and services.*

13          *(D) Engage in interagency partnerships*  
14          *with Federal, State, local, and Tribal govern-*  
15          *ment agencies to explore the use of forecast-in-*  
16          *formed reservoir operations to reduce flood risk*  
17          *and inform decisions related to water resources*  
18          *management.*

19          *(E) Ensure the maintenance and accuracy*  
20          *of flooding and water resource management part-*  
21          *ner call lists, appropriate office hydrologic serv-*  
22          *ice policy or procedures, and other hydrologic in-*  
23          *formation or dissemination methodologies or*  
24          *strategies.*

1           (F) *Work closely with Federal, State, local,*  
2           *and Tribal emergency and floodplain manage-*  
3           *ment agencies, and other agencies relating to dis-*  
4           *aster management, to ensure a planned, coordi-*  
5           *nated, and effective preparedness and response*  
6           *effort.*

7           (5) *ADDITIONAL RESPONSIBILITIES.—A service*  
8           *coordination hydrologist designated under this sub-*  
9           *section may, with respect to hydrology—*

10           (A) *work with a State agency to develop*  
11           *plans for promoting more effective use of prod-*  
12           *ucts and services of the National Weather Service*  
13           *throughout the State concerned;*

14           (B) *identify priority community prepared-*  
15           *ness objectives;*

16           (C) *develop plans to carry out the respon-*  
17           *sibilities described in paragraph (4); and*

18           (D) *conduct flooding event preparedness*  
19           *planning and citizen education efforts with and*  
20           *through various State, local, and Tribal govern-*  
21           *ment agencies and other disaster management-*  
22           *related organizations.*

1 **TITLE III—COMMERCIAL WEATH-**  
2 **ER AND ENVIRONMENTAL OB-**  
3 **SERVATIONS**

4 **SEC. 301. COMMERCIAL DATA PROGRAM.**

5 *The Weather Research and Forecasting Innovation Act*  
6 *of 2017 is amended by striking section 302 (15 U.S.C.*  
7 *8532) and inserting the following new section:*

8 **“SEC. 302. COMMERCIAL DATA PROGRAM.**

9 *“(a) PROGRAM ESTABLISHMENT.—The Under Sec-*  
10 *retary, in coordination with the heads of appropriate offices*  
11 *of the National Oceanic and Atmospheric Administration,*  
12 *shall maintain a Commercial Data Program to coordinate*  
13 *and execute acquisition of weather and environmental data*  
14 *and services from private sector entities for operational use.*

15 *“(b) PROGRAM ELEMENTS.—The Under Secretary*  
16 *shall acquire satellite, ground-based, airborne, or marine-*  
17 *based in situ, remote sensing, or crowd-sourced data and*  
18 *services for operational use relating to weather and environ-*  
19 *mental forecasting and modeling. The Under Secretary*  
20 *shall ensure the Commercial Data Program coordinates,*  
21 *collaborates, and ensures access to data across the Adminis-*  
22 *tration, including among the following:*

23 *“(1) The National Mesonet Program.*

24 *“(2) The Aircraft Based Observation Program.*

1           “(3) *The U.S. Integrated Ocean Observation*  
2           *Program, including existing regional associations.*

3           “(4) *The National Integrated Drought Informa-*  
4           *tion System, including the National Coordinated Soil*  
5           *Moisture Monitoring Network.*

6           “(5) *The Global Ocean Monitoring and Observ-*  
7           *ing Program.*

8           “(6) *The National Data Buoy Center.*

9           “(7) *The Uncrewed Systems Operation Center.*

10          “(8) *The Ocean Exploration Program.*

11          “(9) *Any other program or office the Under Sec-*  
12          *retary determines appropriate.*

13          “(c) *STANDARDS AND SPECIFICATIONS.—Not later*  
14          *than 180 days after the date of the enactment of this section*  
15          *and on a continuous basis thereafter, the Under Secretary*  
16          *shall publish data, metadata, and service standards and*  
17          *specifications required for acquired observation services and*  
18          *data for use, licensing, and attribution to ensure quality,*  
19          *impact, and compatibility of such services and data with*  
20          *National Oceanic and Atmospheric Administration mod-*  
21          *eling capabilities, meteorological situational awareness,*  
22          *and forecasting.*

23          “(d) *PRIORITIZATION.—In acquiring commercial data*  
24          *and services, the Under Secretary shall prioritize obtaining*  
25          *surface-based, airborne-based, space-based, and coastal- and*

1 *ocean-based data, metadata, and services for operational*  
2 *use that participate in the Commercial Data Pilot Program*  
3 *or other programs of the National Oceanic and Atmospheric*  
4 *Administration that acquire commercial data or observa-*  
5 *tions.*

6       “(e) *NOAA OBSERVING SYSTEMS AND FLEET COUN-*  
7 *CILS.—*

8               “(1) *IN GENERAL.—The Under Secretary shall*  
9 *maintain the National Oceanic and Atmospheric Ad-*  
10 *ministration Observing Systems Council and the*  
11 *NOAA Fleet Council (in this subsection referred to as*  
12 *the ‘Councils’) to provide strategic recommendations*  
13 *and guidance regarding the prioritization, design, de-*  
14 *velopment, acquisition, upgrading, lifecycle, perform-*  
15 *ance monitoring, and retiring of major observing sys-*  
16 *tems portfolio components, including related to the*  
17 *acquisition of commercial weather and environmental*  
18 *data and services.*

19               “(2) *LINE OFFICE COORDINATION.—The Councils*  
20 *shall ensure coordination and adherence to uniform*  
21 *policies by providing guidance to all line offices of the*  
22 *National Oceanic and Atmospheric Administration*  
23 *engaged in observing systems portfolio design, tech-*  
24 *nology, development, execution, and operation.*

1           “(3) *COMMITTEE.*—*The Under Secretary shall*  
2           *maintain a Committee within the Councils to develop*  
3           *and approve procedural directives, guides, or hand-*  
4           *books relevant to management of data and informa-*  
5           *tion, including commercial data, and coordinate data*  
6           *governance and management practices across the Na-*  
7           *tional Oceanic and Atmospheric Administration to*  
8           *promote consistent processes.*

9           “(f) *AUTHORIZATION OF APPROPRIATIONS.*—

10           “(1) *IN GENERAL.*—*There are authorized to be*  
11           *appropriated \$100,000,000 for each of fiscal years*  
12           *2024 through 2028 to carry out this section.*

13           “(2) *SENSE OF CONGRESS.*—*It is the sense of*  
14           *Congress that the Under Secretary should seek to*  
15           *enter into contracts or other appropriate agreements*  
16           *that enable the expenditure, to the maximum extent*  
17           *practicable, of amounts authorized to be appropriated*  
18           *or otherwise made available in a fiscal year to carry*  
19           *out this section.*

20           “(g) *DATA AND HOSTED PAYLOADS.*—*Notwith-*  
21           *standing any other provision of law, the Secretary of Com-*  
22           *merce may enter into agreements relating to the following:*

23           “(1) *The purchase of weather and environmental*  
24           *data and services through contracts with commercial*  
25           *data and service providers.*

1           “(2) *The placement of weather instruments on*  
2           *co-hosted Federal, international, or private space, air-*  
3           *borne, maritime, or ground platforms.*

4           “(h) *OMBUDSMAN.—The Under Secretary shall estab-*  
5           *lish or designate at least one Ombudsman position within*  
6           *the Commercial Data Program to implement the rec-*  
7           *ommendations of the Observing System Council under sub-*  
8           *section (e) related to commercial weather and environ-*  
9           *mental data and services acquisitions. Such an Ombuds-*  
10           *man shall act as the liaison between commercial data and*  
11           *service providers and the National Oceanic and Atmos-*  
12           *pheric Administration with respect to receiving rec-*  
13           *ommendations and resolving issues related to engagement,*  
14           *testing, contracting, or other areas related to the Adminis-*  
15           *tration’s efforts to acquire commercial weather and environ-*  
16           *mental data and services.*

17           “(i) *REPORT.—Not later than two years after the date*  
18           *of the enactment of this section, the Under Secretary shall*  
19           *submit to the Committee on Science, Space, and Technology*  
20           *of the House of Representatives and the Committee on Com-*  
21           *merce, Science, and Transportation of the Senate a report*  
22           *evaluating the activities and needed authorities related to*  
23           *data governance and management practices, including ac-*  
24           *quisition, collection, documentation, quality control, vali-*  
25           *ation, reprocessing, storage, retrieval, dissemination, and*

1 *long-term preservation activities across all National Oce-*  
2 *anic and Atmospheric Administration line, staff, and cor-*  
3 *porate offices.”.*

4 **SEC. 302. COMMERCIAL DATA PILOT PROGRAM.**

5 *The Weather Research and Forecasting Innovation Act*  
6 *of 2017 is amended by striking section 303 (15 U.S.C.*  
7 *8533) and inserting the following new section:*

8 **“SEC. 303. COMMERCIAL DATA PILOT PROGRAM.**

9 *“(a) PROGRAM ESTABLISHMENT.—Within the Com-*  
10 *mmercial Data Program under section 302, there shall be a*  
11 *Commercial Data Pilot Program to engage with external*  
12 *partners and providers to test and develop shared standards*  
13 *and methodologies for quality, use, licensing, and attribu-*  
14 *tion of observation services and data, and to ensure quality,*  
15 *impact, and compatibility of such services and data with*  
16 *National Oceanic and Atmospheric Administration mod-*  
17 *eling capabilities, meteorological situational awareness,*  
18 *and forecasting. The Program is authorized to test and*  
19 *evaluate all sources and types of observation services, im-*  
20 *agery, products, and data from private sector entities, in-*  
21 *cluding new and innovative surface-based, airborne-based,*  
22 *space-based, and coastal- and ocean-based data, metadata,*  
23 *and model components.*

24 *“(b) CRITERIA.—The Under Secretary shall ensure*  
25 *that data acquired through the Commercial Data Pilot Pro-*

1 *gram described in subsection (a) meets the most recent*  
2 *standards and specifications required for observation serv-*  
3 *ices and data as published pursuant to section 302(c).*

4       “(c) *PILOT CONTRACTS.*—*The Under Secretary shall,*  
5 *through an open competition, regularly enter into pilot con-*  
6 *tracts with private sector entities capable of providing ob-*  
7 *servations services and data referred to in subsection (a) that*  
8 *meet the standards and specifications published pursuant*  
9 *to section 302(c) for so providing such services and data*  
10 *in a manner that allows the Under Secretary to calibrate*  
11 *and evaluate such services and data for use in National*  
12 *Oceanic and Atmospheric Administration activities.*

13       “(d) *ASSESSMENT OF VIABILITY.*—*The Under Sec-*  
14 *retary shall annually assess and submit to the Committee*  
15 *on Commerce, Science, and Transportation of the Senate*  
16 *and the Committee on Science, Space, and Technology of*  
17 *the House of Representatives a summary of the pilot con-*  
18 *tracts entered into pursuant to subsection (c), the extent to*  
19 *which such contracts meet the standards and specifications*  
20 *published pursuant to section 302(c), and any additional*  
21 *information determined necessary related to the following:*

22               “(1) *The viability of assimilating observation*  
23 *services and data from private sector entities into Na-*  
24 *tional Oceanic and Atmospheric Administration fore-*  
25 *casts and models.*

1           “(2) *The expected value added or improvements*  
2 *from such services and data so assimilated into Na-*  
3 *tional Oceanic and Atmospheric Administration fore-*  
4 *casts and models.*

5           “(3) *The accuracy, quality, timeliness, validity,*  
6 *reliability, usability, information technology security,*  
7 *and cost-effectiveness of obtaining observation services*  
8 *and data from private sector entities.*

9           “(4) *Steps to integrate within one year such*  
10 *services and data into operational use by the Na-*  
11 *tional Oceanic and Atmospheric Administration or*  
12 *any associated challenges in doing so.*

13          “(e) *OBTAINING FUTURE DATA.—If an assessment*  
14 *under subsection (d) demonstrates the ability of commercial*  
15 *services and data to meet the standards and specifications*  
16 *published pursuant to section 302(c), the Under Secretary*  
17 *shall—*

18           “(1) *when cost-effective and feasible, obtain ob-*  
19 *servaion services and data from private sector enti-*  
20 *ties through the Commercial Data Program under*  
21 *section 302;*

22           “(2) *as early as possible in the acquisition proc-*  
23 *ess for any future National Oceanic and Atmospheric*  
24 *Administration satellite system, determine whether*  
25 *there is a suitable, cost-effective, commercial capa-*

1 *bility available or that will be available to meet ap-*  
2 *plicable instrument, spacecraft, or system require-*  
3 *ments before completion of the critical design phase of*  
4 *such planned satellite system;*

5 *“(3) if a suitable, cost-effective, commercial capa-*  
6 *bility is or will be available as described in para-*  
7 *graph (2), determine whether and how such capability*  
8 *is in the national interest if developed as a solely gov-*  
9 *ernmental system; and*

10 *“(4) submit to the Committee on Commerce,*  
11 *Science, and Transportation of the Senate and the*  
12 *Committee on Science, Space, and Technology of the*  
13 *House of Representatives a report detailing any deter-*  
14 *minations made under paragraphs (2) and (3).*

15 *“(f) AUTHORIZATION OF APPROPRIATIONS.—From*  
16 *amounts authorized to be appropriated pursuant to section*  
17 *302 to carry out such section, not less than 15 percent of*  
18 *such amounts each fiscal year are authorized to be appro-*  
19 *priated to carry out this section.”.*

20 **SEC. 303. CONTRACTING AUTHORITY AND AVOIDANCE OF**  
21 **DUPLICATION.**

22 *Title III of the Weather Research and Forecasting In-*  
23 *novation Act of 2017 is amended by adding at the end the*  
24 *following new section:*

1 **“SEC. 304. CONTRACTING AUTHORITY AND AVOIDANCE OF**  
2 **DUPLICATION.**

3 *“(a) IN GENERAL.—Consistent with other Federal*  
4 *agencies that contract and partner with private sector enti-*  
5 *ties, the Under Secretary is authorized to use contracting*  
6 *mechanisms and enter into agreements that utilize*  
7 *multiyear contract options. In carrying out sections 302*  
8 *and 303, the Under Secretary shall, to the greatest extent*  
9 *possible—*

10 *“(1) enter into year-long or multiyear contract*  
11 *options using contracting mechanisms that foster re-*  
12 *siliency of datatypes purchased;*

13 *“(2) partner and contract with multiple observa-*  
14 *tion service and data providers simultaneously to re-*  
15 *duce risks of data gaps and improve mission*  
16 *robustness; and*

17 *“(3) utilize authorities, such as additional forms*  
18 *of transaction agreements under section 301, that*  
19 *allow for innovative partnerships with private sector*  
20 *entities.*

21 *“(b) SAVINGS CLAUSE.—Nothing in this title may be*  
22 *construed as infringing on the acquisition authority or*  
23 *strategy of Federal entities authorized under title 10,*  
24 *United States Code.*

25 *“(c) UNNECESSARY DUPLICATION.—In meeting the re-*  
26 *quirements under this title, the Under Secretary shall avoid*

1 *unnecessary duplication between the National Oceanic and*  
2 *Atmospheric Administration, the National Aeronautics and*  
3 *Space Administration, other Federal departments and*  
4 *agencies, and private sector entities, including relating to*  
5 *corresponding expenditures of funds and employment of*  
6 *personnel by—*

7           “(1) *coordinating existing activities with other*  
8 *civilian Federal departments and agencies which pro-*  
9 *vide, contract, or partner with private sector entities*  
10 *to acquire, weather and environmental observations*  
11 *and data; and*

12           “(2) *coordinating and soliciting weather and en-*  
13 *vironmental observations and data requirements and*  
14 *needs from other civilian Federal departments and*  
15 *agencies to be acquired by the Commercial Data Pro-*  
16 *gram under section 302.*

17           “(d) *FAIR COMPENSATION FOR INTERAGENCY*  
18 *NEEDS.—The Under Secretary, to the maximum extent*  
19 *practicable, shall ensure that Federal departments and*  
20 *agencies utilizing services and data under sections 302 and*  
21 *303 fairly compensate the National Oceanic and Atmos-*  
22 *pheric Administration, or the non-Federal entities pro-*  
23 *viding such services or data, as appropriate, for use.”.*

1 **SEC. 304. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**  
2 **ING PRACTICES.**

3 *Title III of the Weather Research and Forecasting In-*  
4 *novation Act of 2017, as amended by section 303 of this*  
5 *Act, is further amended by adding at the end the following*  
6 *new section:*

7 **“SEC. 305. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**  
8 **ING PRACTICES.**

9 *“(a) DATA STANDARDS.—The Under Secretary, in col-*  
10 *laboration with the weather enterprise, shall seek to estab-*  
11 *lish consistent and open data and metadata standards to*  
12 *support open science, including simple cloud-optimized*  
13 *data formats and application programming interfaces that*  
14 *support findability, accessibility, usability, and*  
15 *preservability.*

16 *“(b) DATA INFRASTRUCTURE.—*

17 *“(1) IN GENERAL.—The Under Secretary, in*  
18 *consultation with the Chief Information Officer and*  
19 *appropriate program heads, shall consolidate and ar-*  
20 *range data infrastructure needs to ensure efficient*  
21 *and effective data transfer between National Oceanic*  
22 *and Atmospheric Administration offices by consid-*  
23 *ering the use of commercial cloud technologies, or*  
24 *similar hybrid structures, to host and transmit data*  
25 *and metadata.*

1           “(2) *FEDERAL PARTNERSHIPS.*—*In carrying out*  
2           *paragraph (1), the Under Secretary may partner*  
3           *with the heads of other Federal departments and*  
4           *agencies, including the National Aeronautics and*  
5           *Space Administration, the Department of Energy, the*  
6           *United States Space Force, the United States Coast*  
7           *Guard, the United States Navy, the Federal Aviation*  
8           *Administration, the United States Forest Service, the*  
9           *Environmental Protection Agency, the National*  
10          *Science Foundation, and the United States Geological*  
11          *Survey, to collocate data with joint utility and sup-*  
12          *port a transition to cloud architectures, including*  
13          *commercial cloud networks.*

14           “(3) *LONG TERM DATA ARCHIVE.*—*The Under*  
15          *Secretary shall ensure the long-term management,*  
16          *maintenance, and stewardship of archival data and*  
17          *metadata acquired through the Commercial Data Pro-*  
18          *gram under section 302 is conducted within the Na-*  
19          *tional Centers for Environmental Information.*

20           “(c) *DATA SHARING WITH THE WEATHER ENTER-*  
21          *PRISE.*—*To the greatest extent practicable, the Under Sec-*  
22          *retary shall make accessible to members of the weather en-*  
23          *terprise that are United States persons data not subject to*  
24          *redistribution contract permissions and purchased through*  
25          *the Commercial Data Program under section 302 or shared*

1 *through international government partners. If purchased*  
2 *data must be assimilated into numerical weather prediction*  
3 *models or automated forecast guidance to satisfy redistribu-*  
4 *tion contract permissions, the Under Secretary shall make*  
5 *accessible without delay to members of the weather enter-*  
6 *prise that are United States persons the numerical weather*  
7 *prediction model or automated forecast guidance output, as*  
8 *the case may be.*

9       “(d) *DATA ASSIMILATION.*—

10               “(1) *IN GENERAL.*—*The Under Secretary, in co-*  
11 *ordination with the Commercial Data Program under*  
12 *section 302, the National Centers for Environmental*  
13 *Information, and any other offices within the Admin-*  
14 *istration, shall establish a program to test, advance,*  
15 *and implement data assimilation methods, which*  
16 *may include artificial intelligence, machine learning,*  
17 *data pre- and post-processing, efficient input and*  
18 *output, and next-generation algorithms.*

19               “(2) *DATA ASSIMILATION UNIVERSITY CONSOR-*  
20 *TIUM.*—*Through the program established pursuant to*  
21 *paragraph (1), the Under Secretary shall establish a*  
22 *consortium consisting of institutions of higher edu-*  
23 *cation (as such term is defined in section 101 of the*  
24 *Higher Education Act of 1965 (20 U.S.C. 1001)) to*  
25 *address critical research challenges for data assimila-*

1        *tion and foster a growing data assimilation work-*  
2        *force. The consortium shall seek to—*

3                *“(A) solve critical research issues for data*  
4                *assimilation through innovative research;*

5                *“(B) increase significantly the number of*  
6                *students, including graduate level and Ph.D.*  
7                *candidates, in data assimilation;*

8                *“(C) utilize modern software and frame-*  
9                *works, such as the Joint Effort for Data Assimi-*  
10               *lation Integration, to conduct data assimilation*  
11               *research and development and facilitate research*  
12               *to operations efforts;*

13               *“(D) identify and prioritize critical re-*  
14               *search areas in data assimilation and facilitate*  
15               *operations to research efforts;*

16               *“(E) establish and enable an effective col-*  
17               *laboration infrastructure between National Oce-*  
18               *anic and Atmospheric Administration facilities,*  
19               *such as labs, centers, or joint agency institutes,*  
20               *and the research community, including a mecha-*  
21               *nism for external partners to host Administra-*  
22               *tion employees; and*

23               *“(F) establish mechanisms to enable all*  
24               *members of the consortium to archive and access*

1           *data required to support the work under this*  
2           *subsection.*

3           “(3) *COORDINATION.*—*In carrying out this sub-*  
4           *section, the Under Secretary shall ensure the National*  
5           *Oceanic and Atmospheric Administration and its as-*  
6           *sociated activities focus on research to operations and*  
7           *operations to research, including by coordinating and*  
8           *collaborating with the Joint Center for Satellite Data*  
9           *Assimilation.*

10           “(4) *DATA ASSIMILATION, MANAGEMENT, AND*  
11           *SHARING PRACTICES SECURITY.*—*The activities au-*  
12           *thorized under this subsection shall be applied in a*  
13           *manner consistent with subtitle D of title VI of the*  
14           *Research and Development, Competition, and Innova-*  
15           *tion Act (enacted as division B of Public Law 117-*  
16           *167; 42 U.S.C. 19231 et seq.).*

17           “(e) *STUDY ON DATA MANAGEMENT.*—

18           “(1) *IN GENERAL.*—*Not later than 90 days after*  
19           *the date of the enactment of this section, the Under*  
20           *Secretary shall seek to enter into an agreement with*  
21           *a non-Federal entity to conduct a study on matters*  
22           *concerning data practices and management needs at*  
23           *the National Oceanic and Atmospheric Administra-*  
24           *tion. In conducting the study, the outside entity*  
25           *shall—*

1           “(A) assess the costs and benefits of current  
2           data management needs for observational and  
3           operational mission requirements;

4           “(B) develop recommendations regarding  
5           how to make more robust and cost-effective the  
6           data portfolio of the Administration;

7           “(C) identify data infrastructure tech-  
8           nologies and needs that are essential to the per-  
9           formance of modeling systems of the Administra-  
10          tion;

11          “(D) assess the sharing needs and practices  
12          of the Administration for both internal and ex-  
13          ternal sharing dissemination; and

14          “(E) develop recommendations for methods  
15          of data infrastructure sharing, including data  
16          purchased from the commercial sector.

17          “(2) *AUTHORIZATION OF APPROPRIATIONS.*—  
18          From amounts authorized to be appropriated to the  
19          Commercial Data Program under section 302, there  
20          are authorized to be appropriated to carry out the  
21          study under paragraph (1) \$1,000,000, to remain  
22          available until expended.”.

23 **SEC. 305. CLERICAL AMENDMENT.**

24          The table of contents in section 1(b) of the Weather  
25          Research and Forecasting Innovation Act of 2017 is amend-

1 *ed by striking the items relating to sections 302 and 303*  
 2 *and inserting the following new items:*

“Sec. 302. Commercial Data Program.

“Sec. 303. Commercial Data Pilot Program.

“Sec. 304. Contracting authority and avoidance of duplication.

“Sec. 305. Data assimilation, management, and sharing practices.”.

3           **TITLE IV—COMMUNICATING**  
 4           **WEATHER TO THE PUBLIC**

5 **SEC. 401. DEFINITIONS.**

6           *In this title:*

7           (1) *HAZARDOUS WEATHER OR WATER EVENTS.—*

8           *The term “hazardous weather or water events” has the*  
 9           *meaning given such term in section 406 of the Weath-*  
 10           *er Research and Forecasting Innovation Act of 2017*  
 11           *(Public Law 115–25; 131 Stat. 109), as amended by*  
 12           *section 402 of this Act.*

13           (2) *INSTITUTION OF HIGHER EDUCATION.—The*  
 14           *term “institution of higher education” has the mean-*  
 15           *ing given such term in section 101 of the Higher Edu-*  
 16           *cation Act of 1965 (20 U.S.C. 1001).*

17           (3) *NOAA WEATHER RADIO.—The term “NOAA*  
 18           *Weather Radio” means the National Oceanic and At-*  
 19           *mospheric Administration Weather Radio All Haz-*  
 20           *ards network.*

21           (4) *PUBLIC CLOUD.—The term “public cloud”*  
 22           *means an information technology model in which*  
 23           *service providers make computing services, including*

1 *compute and storage and develop-and-deploy environ-*  
2 *ments and applications, available on-demand to orga-*  
3 *nizations and individuals over the public internet or*  
4 *other means that allows for the widest dissemination*  
5 *of information.*

6 (5) *WATCH; WARNING.—The terms “watch” and*  
7 *“warning” have the meanings given such terms in*  
8 *section 406 of the Weather Research and Forecasting*  
9 *Innovation Act of 2017 (Public Law 115–25; 131*  
10 *Stat. 109), as amended by section 402 of this Act.*

11 **SEC. 402. HAZARDOUS WEATHER OR WATER EVENT RISK**  
12 **COMMUNICATION.**

13 (a) *IN GENERAL.—Section 406 of the Weather Re-*  
14 *search and Forecasting Innovation Act of 2017 (Public Law*  
15 *115–25; 131 Stat. 109) is amended to read as follows:*

16 **“SEC. 406. HAZARDOUS WEATHER OR WATER EVENT RISK**  
17 **COMMUNICATION.**

18 *“(a) DEFINITIONS.—In this section:*

19 *“(1) HAZARDOUS WEATHER OR WATER*  
20 *EVENTS.—The term ‘hazardous weather or water*  
21 *events’ means weather or water events that have a*  
22 *high risk of loss of life or property, including the fol-*  
23 *lowing:*

24 *“(A) Severe storms, such as hurricanes and*  
25 *short-fused, small-scale hazardous weather or hy-*

1           *drologic events produced by thunderstorms, in-*  
2           *cluding large hail, damaging winds, tornadoes,*  
3           *and flash floods.*

4           “(B) *Winter storms, such as freezing or fro-*  
5           *zen precipitation (including freezing rain, sleet,*  
6           *and snow), or combined effects of freezing or fro-*  
7           *zen precipitation and strong winds.*

8           “(C) *Other weather hazards, such as ex-*  
9           *treme heat or cold, wildfire, drought, dense fog,*  
10          *high winds, and river, coastal, or lakeshore flood-*  
11          *ing.*

12          “(2) *INSTITUTION OF HIGHER EDUCATION.—The*  
13          *term ‘institution of higher education’ has the meaning*  
14          *given such term in section 101 of the Higher Edu-*  
15          *cation Act of 1965 (20 U.S.C. 1001).*

16          “(3) *WATCH; WARNING.—*

17                 “(A) *IN GENERAL.—The terms ‘watch’ and*  
18                 *‘warning’, with respect to a hazardous weather*  
19                 *or water event, mean products issued by the Na-*  
20                 *tional Oceanic and Atmospheric Administration,*  
21                 *intended for consumption by the general public,*  
22                 *to alert the general public to the potential for or*  
23                 *presence of such event and to inform action to*  
24                 *prevent loss of life or property.*

1                   “(B) *EXCEPTION.*—*The terms ‘watch’ and*  
2                   *‘warning’ do not include technical or specialized*  
3                   *meteorological or hydrological forecasts, outlooks,*  
4                   *or model guidance products.*

5                   “(b) *SYSTEM COMMUNICATIONS.*—*The Under Sec-*  
6                   *retary shall maintain and improve the system of the Na-*  
7                   *tional Oceanic and Atmospheric Administration by which*  
8                   *the risks of hazardous weather or water events are commu-*  
9                   *nicated to the general public, with the goal of informing*  
10                   *response to prevent loss of life or property.*

11                   “(c) *HAZARD RISK COMMUNICATION IMPROVEMENT*  
12                   *AND SIMPLIFICATION.*—

13                   “(1) *IN GENERAL.*—*To carry out subsection (b),*  
14                   *the Under Secretary shall maintain a social, behav-*  
15                   *ioral, risk, communication, and economic sciences*  
16                   *program (in this section referred to as the ‘Program’),*  
17                   *for the purpose of simplifying and improving the*  
18                   *communication of hazardous weather or water events.*

19                   “(2) *TERMINOLOGY.*—*The Program, in coordina-*  
20                   *tion with social, behavioral, risk, communication, and*  
21                   *economic science community and user feedback, shall*  
22                   *identify, eliminate, or modify unnecessary, redun-*  
23                   *dant, or confusing terms for communications regard-*  
24                   *ing hazardous weather or water events and add new*  
25                   *terminology, as appropriate.*

1           “(3) *COMMUNICATIONS IMPROVEMENT.*—*The*  
2           *Program shall improve the form, content, and meth-*  
3           *ods of communications regarding hazardous weather*  
4           *or water events and associated risks to more clearly*  
5           *inform response to prevent the loss of life or property.*

6           “(4) *EVALUATIONS.*—*The Program, in coordina-*  
7           *tion with the performance and evaluation branches of*  
8           *the National Weather Service and Oceanic and At-*  
9           *mospheric Research, shall develop metrics for such*  
10           *branches to track and evaluate the degree to which*  
11           *communications regarding hazardous weather or*  
12           *water events inform response.*

13           “(5) *SUPPORT PLAN.*—*The Program shall de-*  
14           *velop a plan for the purpose of carrying out para-*  
15           *graph (3). Such plan shall be periodically updated*  
16           *and informed by internal and extramural research*  
17           *and the results of the evaluation of communications*  
18           *regarding hazardous weather or water events and as-*  
19           *sociated risks under paragraph (4).*

20           “(6) *METHODS.*—*In carrying out this section,*  
21           *the Program shall develop and implement rec-*  
22           *ommendations that—*

23                   “(A) *are based on the best and most recent*  
24                   *understanding from social, behavioral, economic,*  
25                   *risk, and communications science research;*

1           “(B) are validated by social, behavioral,  
2           risk, and communications science, taking into  
3           account the importance of methods that support  
4           reproduction and replication of scientific studies,  
5           use of rigorous statistical analyses, and, as ap-  
6           plicable, data analysis supported by artificial  
7           intelligence and machine learning technologies;

8           “(C) account for the needs of various demo-  
9           graphics, vulnerable populations, and geographic  
10          regions;

11          “(D) account for the differences between  
12          various types of hazardous weather or water  
13          events;

14          “(E) respond to the needs of Federal, State,  
15          and local government partners and media part-  
16          ners; and

17          “(F) account for necessary changes in the  
18          infrastructure, technology, and protocols for de-  
19          veloping and disseminating watches and warn-  
20          ings.

21          “(7) COORDINATION.—In carrying out this sec-  
22          tion, the Program shall coordinate with the following:

23                 “(A) Federal partners, including National  
24                 Laboratories, cooperative institutes, and regional  
25                 integrated sciences and assessments programs.

1           “(B) *State and local government partners.*

2           “(C) *Tribal governments.*

3           “(D) *Institutions of higher education or a*  
4           *consortia thereof.*

5           “(E) *Media partners.*

6           “(8) *TIMELINESS AND CONSISTENCY.—The Pro-*  
7           *gram shall develop best practices and guidance for en-*  
8           *surving timely and consistent communications across*  
9           *public facing platforms that disseminate information*  
10          *related to hazardous weather or water events.”.*

11          “(b) *TABLE OF CONTENTS.—Section 1(b) of the Weather*  
12          *Research and Forecasting Innovation Act of 2017 is amend-*  
13          *ed by amending the item relating to section 406 to read*  
14          *as follows:*

          “*Sec. 406. Hazardous Weather or Water Event Risk Communication.*”.

15          **SEC. 403. HAZARD COMMUNICATION RESEARCH AND EN-**  
16                                   **GAGEMENT.**

17          *Section 406 of the Weather Research and Forecasting*  
18          *Innovation Act of 2017 (Public Law 115–25; 131 Stat.*  
19          *109), as amended by section 402 of this Act, is further*  
20          *amended by adding at the end the following new sub-*  
21          *sections:*

22          “(d) *HAZARD COMMUNICATION RESEARCH AND EN-*  
23          *GAGEMENT.—*

24               “(1) *IN GENERAL.—The Under Secretary shall*  
25               *maintain, as appropriate, a program to—*

1           “(A) modernize the development and com-  
2           munication of risk-based, statistically reliable,  
3           probabilistic hazard information, with the goal  
4           of informing appropriate responses to hazardous  
5           weather or water events; and

6           “(B) improve the fundamental social, be-  
7           havioral, economic, risk, and communication  
8           science relating to communications, including by  
9           means of collecting voluntary data, regarding  
10          hazardous weather or water events.

11          “(2) COORDINATION.—In carrying out the pro-  
12          gram under paragraph (1), the Under Secretary shall  
13          coordinate and communicate with States, Tribal gov-  
14          ernments, localities, and emergency managers regard-  
15          ing research priorities and results.

16          “(3) PILOT PROGRAM FOR TORNADO HAZARD  
17          COMMUNICATION REQUIRED.—To further research into  
18          communications regarding hazardous weather or  
19          water events, the Under Secretary, in coordination  
20          with the VORTEX program under section 103 and in  
21          collaboration with one or more eligible institutions  
22          (or a consortia thereof), shall establish a pilot pro-  
23          gram for tornado hazard communication to test the  
24          effectiveness of implementing research into operations  
25          with respect to tornadoes.

1           “(4) *PILOT STUDY FOR HURRICANE HAZARD*  
2           *COMMUNICATION.—*

3           “(A) *IN GENERAL.—To further research into*  
4           *communications regarding hazardous weather or*  
5           *water events, the Under Secretary, in coordina-*  
6           *tion with the hurricane forecast improvement*  
7           *program under section 104, shall seek to enter*  
8           *into an agreement with an appropriate entity,*  
9           *as determined by the Under Secretary, to con-*  
10          *duct a pilot study using a mixed methods ap-*  
11          *proach, such as surveys, focus groups, and inter-*  
12          *views, to gather information from hurricane*  
13          *prone population areas regarding the levels of*  
14          *preparedness of such areas for hurricanes or in*  
15          *response to the National Oceanic and Atmos-*  
16          *pheric Administration’s early forecasts and*  
17          *warnings. Such study shall evaluate the fol-*  
18          *lowing:*

19                   “(i) *Possession of disaster supplies.*

20                   “(ii) *Evacuation decisions.*

21                   “(iii) *Levels of trust of tropical cyclone*  
22                   *information and hurricane path prediction*  
23                   *from various sources.*

1           “(iv) *Access to tropical cyclone and*  
2           *hurricane warnings in such study partici-*  
3           *part’s first language.*

4           “(v) *Determination regarding such*  
5           *study participant’s reasoning that may*  
6           *hinder the ability of such a participant to*  
7           *evacuate or willingness to evacuate.*

8           “(B) *ADDITIONAL CRITERIA.—The pilot*  
9           *study described in subparagraph (A) shall define*  
10          *its methodology and be made publicly available*  
11          *on a website of the National Oceanic and Atmos-*  
12          *pheric Administration.*

13          “(5) *ELIGIBLE INSTITUTION DEFINED.—In this*  
14          *subsection, the term ‘eligible institution’ means any of*  
15          *the following:*

16               “(A) *An institution of higher education,*  
17               *nonprofit organization, or other institution lo-*  
18               *cated in a jurisdiction eligible to participate in*  
19               *the program under section 113 of the National*  
20               *Science Foundation Authorization Act of 1988*  
21               *(42 U.S.C. 1862g).*

22               “(B) *An institution of higher education,*  
23               *nonprofit organization, or other institution lo-*  
24               *cated in proximity to a Weather Forecast Office*  
25               *of the National Weather Service.*

1       “(e) *HURRICANE SOCIAL, BEHAVIORAL, AND ECO-*  
2 *NOMIC SCIENCES.*—As part of the program carried out  
3 under subsection (d), the Under Secretary shall carry out  
4 research and development activities to improve how the  
5 public receives, interprets, responds to, and values hurri-  
6 cane forecasts and warnings. In conducting such activities,  
7 the Under Secretary shall—

8               “(1) conduct a comprehensive review of what is  
9 known about how the public receives, interprets, re-  
10 sponds to, and makes decisions regarding hurricane  
11 forecasts and warnings, including—

12                       “(A) how the connections between weather  
13 observations, downstream models, and processes  
14 affect the decision tools or products derived from  
15 such hurricane forecasts and warnings;

16                       “(B) how such hurricane forecasts and  
17 warnings generated by decision tools and prod-  
18 ucts are used by emergency managers, govern-  
19 ments, and other users to benefit the public and  
20 stakeholder groups;

21                       “(C) how past experiences with hurricanes  
22 impacts decision making;

23                       “(D) how the source of such hurricane fore-  
24 casts and warnings affects interpretation;

1           “(E) how tropical cyclone warnings and  
2 watches are received and interpreted;

3           “(F) how understanding of and response to  
4 such hurricane forecasts and warnings vary  
5 across demographic groups, including the elderly,  
6 people with disabilities, and other vulnerable  
7 populations;

8           “(G) language barriers; and

9           “(H) how understanding and response to  
10 such hurricane forecasts and warnings varies  
11 across geographic areas, including rural, urban,  
12 and suburban areas;

13           “(2) identify communication data gaps based on  
14 the review conducted pursuant to paragraph (1);

15           “(3) carry out research, including data collection  
16 and baseline assessments, in coordination with the  
17 hurricane forecast improvement program under sec-  
18 tion 104 to evaluate and quantify the economic value  
19 of extending lead times of tropical cyclone and hurri-  
20 cane warnings and watches, including identifying the  
21 most effected or vulnerable populations and potential  
22 impacts to those populations;

23           “(4) as part of post-storm surveys and assess-  
24 ments conducted under section 406 of the Weather Act  
25 Reauthorization Act of 2023, conduct retrospective or

1 *ex ante assessments of previous hurricane forecasts*  
2 *and warnings with improvements to better under-*  
3 *stand the key components, including expected actions*  
4 *or behavior changes, of the value of the forecasts and*  
5 *warnings provided;*

6 “(5) *conduct cost benefit analysis of forecasts*  
7 *and warnings improvement alternatives developed*  
8 *through the hurricane forecast improvement program*  
9 *under section 104; and*

10 “(6) *conduct risk assessments for pre-, during,*  
11 *and post-storm periods in regions and communities*  
12 *with significant elderly populations, including retire-*  
13 *ment communities.”.*

14 **SEC. 404. NATIONAL WEATHER SERVICE COMMUNICATIONS**  
15 **IMPROVEMENT.**

16 (a) *IMPROVEMENT OF NWS INSTANT MESSAGING*  
17 *SERVICE.*—*The Director of the National Weather Service*  
18 *shall improve the instant messaging service used by per-*  
19 *sonnel of the National Weather Service by implementing,*  
20 *not later than October 1, 2027, a commercial off-the-shelf*  
21 *communications solution that replaces the instant mes-*  
22 *saging service commonly referred to as “NWSChat”.*

23 (b) *REQUIREMENTS.*—*The communications solution*  
24 *implemented under this section shall—*

25 (1) *be hosted on the public cloud; and*

1           (2) *satisfy requirements set forth by the Director*  
2           *to ensure such solution—*

3                   (A) *best accommodates future growth;*

4                   (B) *performs successfully with increased*  
5                   *numbers of users;*

6                   (C) *is easy to use for the majority of users;*

7                   *and*

8                   (D) *is similar to systems already in com-*  
9                   *mercial use.*

10          (c) *FUNDING.—From amounts made available for Op-*  
11          *erations, Research, and Facilities, the Director of the Na-*  
12          *tional Weather Service shall allocate up to \$3,000,000 for*  
13          *each of fiscal years 2024 through 2027 to carry out this*  
14          *section.*

15          **SEC. 405. NOAA WEATHER RADIO MODERNIZATION.**

16          (a) *IN GENERAL.—The Under Secretary shall, to the*  
17          *maximum extent practicable, expand coverage of the NOAA*  
18          *Weather Radio and ensure its reliability. In carrying out*  
19          *this subsection, the Under Secretary shall—*

20                   (1) *maintain support for existing systems serv-*  
21                   *ing areas not covered by or having poor quality cel-*  
22                   *lular service;*

23                   (2) *ensure consistent maintenance and oper-*  
24                   *ations monitoring, with timely repairs to broadcast*  
25                   *transmitter site equipment and antennas;*

1           (3) *enhance the ability to amplify Non-Weather*  
2           *Emergency Messages via NOAA Weather Radio as*  
3           *necessary; and*

4           (4) *acquire additional transmitters as required*  
5           *to expand coverage to rural and underserved commu-*  
6           *nities, units of the National Park System, and Na-*  
7           *tional Recreation Areas.*

8           (b) *MODERNIZATION INITIATIVE.*—*To the maximum*  
9           *extent practicable, the Under Secretary shall enhance*  
10           *NOAA Weather Radio to ensure its capabilities and cov-*  
11           *erage remain valuable to the public. In carrying out this*  
12           *section, the Under Secretary shall—*

13           (1) *upgrade telecommunications infrastructure of*  
14           *NOAA Weather Radio to accelerate the transition of*  
15           *broadcasts to internet protocol-based communications*  
16           *over non-copper media;*

17           (2) *accelerate software upgrades to the Advanced*  
18           *Weather Interactive Processing System, or the rel-*  
19           *evant system successors, to implement partial county*  
20           *notifications and alerts;*

21           (3) *consult with relevant stakeholders, including*  
22           *the private sector, to enhance accessibility and*  
23           *usability of NOAA Weather Radio data and feeds;*

24           (4) *develop options, including satellite backup*  
25           *capability and commercial provider partnerships, for*

1        *NOAA Weather Radio continuity in the event of*  
2        *Weather Forecast Office outages;*

3            *(5) research and develop alternative options, in-*  
4        *cluding microwave capabilities, to transmit NOAA*  
5        *Weather Radio signals to transmitters that are remote*  
6        *or do not have internet protocol capability; and*

7            *(6) transition critical applications to the Inte-*  
8        *grated Dissemination Program, or the relevant pro-*  
9        *gram successors.*

10        *(c) PRIORITY.—In carrying out subsection (b), the*  
11        *Under Secretary shall prioritize practices, capabilities, and*  
12        *technologies recommended in accordance with the assess-*  
13        *ment under subsection (d) to maximize accessibility, par-*  
14        *ticularly in remote and underserved areas of the United*  
15        *States.*

16        *(d) ASSESSMENT FOR MANAGEMENT AND DISTRIBUTION.—Not later than one year after the date of the enact-*  
17        *ment of this Act, the Under Secretary shall complete an*  
18        *assessment of access to NOAA Weather Radio. In con-*  
19        *ducting such assessment, the Under Secretary shall take*  
20        *into consideration and provide recommendations regarding*  
21        *the following:*  
22        *the following:*

23            *(1) The need for continuous, adequate, and oper-*  
24        *ational real-time broadcasts of the NOAA Weather*  
25        *Radio in both urban and rural areas.*

1           (2) *Solicited inputs from relevant stakeholders*  
2           *on the compatibility of NOAA Weather Radio data*  
3           *for third party platforms that provide online services,*  
4           *such as websites and mobile device applications, or*  
5           *deliver NOAA Weather Radio access.*

6           (3) *Existing or new management systems that*  
7           *promote consistent, efficient, and compatible access to*  
8           *NOAA Weather Radio.*

9           (4) *The ability of NOAA to aggregate real time*  
10          *broadcast feeds at one or more central locations.*

11          (5) *Effective interagency coordination.*

12          (6) *The potential effects of an electromagnetic*  
13          *pulse or geomagnetic disturbance on NOAA Weather*  
14          *Radio.*

15          (7) *Any other function the Under Secretary de-*  
16          *termines necessary.*

17 **SEC. 406. POST-STORM SURVEYS AND ASSESSMENTS.**

18          (a) *IN GENERAL.*—*The Under Secretary shall continue*  
19          *to perform one or more post-storm surveys and assessments*  
20          *following every hazardous weather or water event deter-*  
21          *mined by the Under Secretary to be of sufficient societal*  
22          *importance to warrant a post-event survey and assessment.*

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

1 cation (or a consortia thereof) when conducting post-storm  
2 surveys and assessments under this section to optimize data  
3 collection, sharing, integration, archiving, and access, as  
4 appropriate for research needs.

5 (c) *DATA AVAILABILITY.*—The Under Secretary shall  
6 make the appropriate data obtained from each post-storm  
7 survey and assessment conducted under this section avail-  
8 able to the public as soon as practicable after conducting  
9 each such survey and assessment.

10 (d) *IMPROVEMENT.*—In carrying out this section, the  
11 Under Secretary shall—

12 (1) examine the role of uncrewed aerial and ma-  
13 rine systems in data collection during post-storm sur-  
14 veys and assessments conducted under this section;

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

19 (3) to the maximum extent practicable, increase  
20 the number of post-storm community impact studies,  
21 particularly among under-observed, underserved, or  
22 highly vulnerable populations, including—

23 (A) surveying-individual responses;

24 (B) conducting review of the accuracy of  
25 prior risk evaluations;



1 *Committee on Science, Space, and Technology of the House*  
2 *of Representatives a report that examines the information*  
3 *technology infrastructure of the National Weather Service*  
4 *of the National Oceanic and Atmospheric Administration,*  
5 *specifically regarding the system for timely public notifica-*  
6 *tion via alerts and updates regarding hazardous weather*  
7 *or water events.*

8 (b) *ELEMENTS.*—*The report required by subsection (a)*  
9 *shall include the following:*

10 (1) *An analysis of the information technology in-*  
11 *frastructure of the National Weather Service, includ-*  
12 *ing software and hardware capabilities and limita-*  
13 *tions, including an examination of server and data*  
14 *storage methods, broadband, data management, and*  
15 *data sharing.*

16 (2) *An identification of secondary and tertiary*  
17 *fail-safes for the timely distribution to the public of*  
18 *notifications via alerts and updates regarding haz-*  
19 *ardous weather or water events.*

20 (3) *A process analysis to determine the source*  
21 *and extent to which public notifications via alerts*  
22 *and updates regarding hazardous weather or water*  
23 *events have been delayed and an identification of pos-*  
24 *sible improvements or corrective measures to address*  
25 *latency in the notification process.*

1           (4) *An assessment of whether collaboration with*  
2 *other Federal offices, States, or private entities could*  
3 *reduce delays in notifications to the public.*

4           (5) *A description of actions being undertaken to*  
5 *better identify critical steps in public notification via*  
6 *alerts and updates for hazardous weather or water*  
7 *events that may be vulnerable to disruption or failure*  
8 *in the event of communication, technologic, or com-*  
9 *putational failure.*

10          (6) *The geographical differences in availability*  
11 *and effectiveness of rural systems, including an esti-*  
12 *mated number of rural areas affected by unreliable or*  
13 *unavailable accurate systems and barriers to obtain*  
14 *or upgrade such systems.*

15 **SEC. 408. DATA COLLECTION MANAGEMENT AND PROTEC-**  
16 **TION.**

17          (a) *DATA COLLECTION.*—*The Under Secretary may*  
18 *collect social, behavioral, and economic data, including*  
19 *Federal communication and related public response to haz-*  
20 *ardous weather or water events. Where appropriate, the*  
21 *Under Secretary shall encourage use of secondary data,*  
22 *purchase data, or partner with the private sector.*

23          (b) *DATA MANAGEMENT.*—*The Under Secretary shall*  
24 *establish a central repository system for the National Oce-*  
25 *anic and Atmospheric Administration for social, behav-*

1 *ioral, and economic data related to the communication of*  
2 *and related public response to hazardous weather or water*  
3 *events, including data developed or received pursuant to*  
4 *this title.*

5 *(c) PROTECTION OF DATA.—The Under Secretary shall*  
6 *ensure that all data collected and managed by the Adminis-*  
7 *tration is done within with all legal, regulatory, and con-*  
8 *tractual obligations and in accordance with chapter 31 of*  
9 *title 44, United States Code, and the Federal Evidence-*  
10 *Based Policymaking Act of 2018 (Public Law 115–435).*

11 *(d) DIGITAL WATERMARKING.—The Under Secretary*  
12 *shall develop methods to reduce the likelihood of unauthor-*  
13 *ized tampering with online public notifications of haz-*  
14 *ardous weather or water events, such as developing digital*  
15 *watermarks.*

16 *(e) POLICIES AND PROCEDURES.—The Under Sec-*  
17 *retary shall establish policies and procedures for the collec-*  
18 *tion, archiving, and stewardship of data on community re-*  
19 *sponse, including the response of effected or vulnerable pop-*  
20 *ulations, to hazardous weather or water events.*

1 **TITLE V—IMPROVING WEATHER**  
2 **INFORMATION FOR AGRICULTURE AND WATER MAN-**  
3 **AGEMENT**  
4

5 **SEC. 501. WEATHER AND CLIMATE INFORMATION IN AGRICULTURE AND WATER MANAGEMENT.**  
6

7 *Section 1762 of the Food Security Act of 1985 (15*  
8 *U.S.C. 8521) is amended—*

9 *(1) by amending subsection (h) to read as follows:*  
10 *lows:*

11 *“(h) SUBSEASONAL TO SEASONAL FORECASTING*  
12 *PILOT PROJECTS.—*

13 *“(1) ESTABLISHMENT.—The Under Secretary*  
14 *shall establish not fewer than two pilot projects, in*  
15 *accordance with paragraph (2), within the U.S.*  
16 *Weather Research Program of the Oceanic and Atmos-*  
17 *pheric Research office of the National Oceanic and*  
18 *Atmospheric Administration to support improved*  
19 *subseasonal to seasonal precipitation forecasts for the*  
20 *following:*

21 *“(A) Water management in the western*  
22 *United States.*

23 *“(B) Agriculture in the central United*  
24 *States.*

1           “(2) *OBJECTIVES.*—*In carrying out this sub-*  
2           *section, the Under Secretary shall ensure the fol-*  
3           *lowing:*

4                   “(A) *A pilot project under subparagraph*  
5                   *(A) of paragraph (1) addresses key science chal-*  
6                   *lenges to improving forecasts and developing re-*  
7                   *lated products for water management in the*  
8                   *western United States, including the following:*

9                           “(i) *Improving operational model reso-*  
10                           *lution, both horizontal and vertical, to re-*  
11                           *solve issues associated with mountainous*  
12                           *terrain, such as intensity of precipitation*  
13                           *and relative fraction of rain versus snow*  
14                           *precipitation.*

15                           “(ii) *Improving fidelity in the oper-*  
16                           *ational modeling of the atmospheric bound-*  
17                           *ary layer in mountainous regions.*

18                           “(iii) *Resolving challenges in pre-*  
19                           *dicting winter atmospheric circulation and*  
20                           *storm tracks, including periods of blocked*  
21                           *versus unblocked flow over the eastern North*  
22                           *Pacific Ocean and western United States.*

23                           “(iv) *Utilizing outcomes from the At-*  
24                           *mospheric Rivers Forecast Improvement*  
25                           *Program as authorized in section 204 of the*

1           *Weather Act Reauthorization Act of 2023 to*  
2           *produce operational tools and services.*

3           “(v) *Improving the quality and tem-*  
4           *poral and spatial resolution of observations*  
5           *and accurate operational modeling of air-*  
6           *sea interactions, and the influence of oceans*  
7           *on subseasonal and seasonal forecasting.*

8           “(B) *A pilot project under subparagraph*  
9           *(B) of paragraph (1) addresses key science chal-*  
10          *lenges to improving forecasts and developing re-*  
11          *lated products for agriculture in the central*  
12          *United States, including the following:*

13           “(i) *Improving the quality and tem-*  
14           *poral and spatial resolution of observations*  
15           *and accurate operational modeling of the*  
16           *land surface and hydrologic cycle, including*  
17           *soil moisture and flash drought processes.*

18           “(ii) *Improving fidelity in the oper-*  
19           *ational modeling of warm season precipita-*  
20           *tion processes.*

21           “(iii) *Understanding and predicting*  
22           *large-scale upper-level dynamical flow*  
23           *anomalies that occur in spring and sum-*  
24           *mer.*

1           “(3) *ACTIVITIES.*—A pilot project under this  
2           subsection shall include activities that carry out the  
3           following:

4                   “(A) *Best implement recommendations of*  
5                   *the National Weather Service’s 2020 Report, en-*  
6                   *titled ‘Subseasonal and Seasonal Forecasting In-*  
7                   *novation: Plans for the Twenty-First Century’.*

8                   “(B) *Achieve measurable objectives for oper-*  
9                   *ational forecast improvement.*

10                   “(C) *Engage with, and leverage the re-*  
11                   *sources of, institutions of higher education (as*  
12                   *such term is defined in section 101 of the Higher*  
13                   *Education Act of 1965 (20 U.S.C. 1001)), or a*  
14                   *consortia thereof, and entities within the Na-*  
15                   *tional Oceanic and Atmospheric Administration*  
16                   *in existence as of the date of the enactment of*  
17                   *this subsection, including Regional Climate Cen-*  
18                   *ters and the National Centers for Environmental*  
19                   *Information.*

20                   “(D) *Are carried out in coordination with*  
21                   *the Assistant Administrator for the Office of Oce-*  
22                   *anic and Atmospheric Research and the Director*  
23                   *of the National Weather Service.*

24           “(4) *SUNSET.*—*The authority under this sub-*  
25           *section shall terminate on the date that is five years*

1 *after the date of the enactment of this subsection.”;*

2 *and*

3 *(2) by amending subsection (j) to read as follows:*

4 *“(j) AUTHORIZATION OF APPROPRIATIONS.—There are*  
5 *authorized to be appropriated \$45,000,000 for each of fiscal*  
6 *years 2024 through 2028 to carry out the activities under*  
7 *this section.”.*

8 **SEC. 502. NATIONAL INTEGRATED DROUGHT INFORMATION**  
9 **SYSTEM.**

10 *(a) IN GENERAL.—Section 3 of the National Inte-*  
11 *grated Drought Information System Act of 2006 (15 U.S.C.*  
12 *313d) is amended—*

13 *(1) in subsection (b)—*

14 *(A) in paragraph (1)—*

15 *(i) in subparagraph (A), by striking*  
16 *“and” after the semicolon;*

17 *(ii) in subparagraph (B), by inserting*  
18 *“and” after the semicolon; and*

19 *(iii) by adding at the end the following*  
20 *new subparagraph:*

21 *“(C) incorporates flash drought research*  
22 *and tools to enhance timely response;”;*

23 *(B) in paragraph (5), by striking “and”*  
24 *after the semicolon;*

25 *(C) in paragraph (6)—*

1                   (i) by inserting “(including ecological  
2                   drought)” after “drought” each place it ap-  
3                   pears; and

4                   (ii) by striking the period and insert-  
5                   ing a semicolon; and

6                   (D) by adding at the end the following new  
7                   paragraphs:

8                   “(7) advance and deploy next generation tech-  
9                   nologies related to drought and related publicly avail-  
10                  able data, such as monitoring, preparedness, and fore-  
11                  casting capabilities utilizing artificial intelligence,  
12                  machine learning, and cloud technologies; and

13                  “(8) utilize observational networks, including the  
14                  National Weather Service cooperative observer pro-  
15                  gram and State or regional hydrological monitoring  
16                  projects, and refine drought indicators across a vari-  
17                  ety of spatial and temporal scales for decision-support  
18                  products by optimizing data and resources from  
19                  across the Federal Government, including snowpack,  
20                  soil moisture, groundwater, and rapid intensification  
21                  data.”;

22                  (2) in subsection (c)—

23                         (A) in paragraph (2), by striking “and”  
24                         after the semicolon;

1                   (B) in paragraph (3), by striking the period  
2                   and inserting “; and”; and

3                   (C) by adding at the end the following new  
4                   paragraph:

5                   “(4) in partnership with the National Mesonet  
6                   Program, establish memoranda of understanding to  
7                   provide coordinated, high-quality, nationwide drought  
8                   information for the public good, including integrated  
9                   soil moisture information in accordance with the  
10                  2021 report, ‘A Strategy for the National Coordinated  
11                  Soil Moisture Monitoring Network.’”; and

12                  (3) by amending subsection (f) to read as follows:

13                  “(f) *MODELING UPDATE.*—The Under Secretary, in  
14                  partnership with National Integrated Drought Information  
15                  System and the Climate Prediction Center of the National  
16                  Weather Service, shall undertake an effort to transition ex-  
17                  isting drought products to probabilistic forecasts and incor-  
18                  porate new and improved dynamical and statistical fore-  
19                  cast modeling tools.”.

20                  (b) *AUTHORIZATION OF APPROPRIATIONS.*—Section 4  
21                  of the National Integrated Drought Information System Act  
22                  of 2006 (15 U.S.C. 313d note) is amended to read as follows:

23                  “**SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

24                  “From amounts made available to Operations, Re-  
25                  search, and Facilities of the National Oceanic and Atmos-

1 *pheric Administration, there are authorized to be appro-*  
2 *priated to carry out this section the following:*

3           “(1) \$15,000,000 for fiscal year 2024.

4           “(2) \$15,500,000 for fiscal year 2025.

5           “(3) \$16,000,000 for fiscal year 2026.

6           “(4) \$16,500,000 for fiscal year 2027.

7           “(5) \$17,000,000 for fiscal year 2028.”.

8 **SEC. 503. NATIONAL MESONET PROGRAM.**

9           (a) *PROGRAM.*—*The Under Secretary shall maintain*  
10 *the National Mesonet Program (in this section referred to*  
11 *as the “Program”). The Program shall—*

12           (1) *obtain observations in all geographic envi-*  
13 *ronments to improve understanding of and forecast*  
14 *capabilities for atmospheric and water events, with a*  
15 *prioritization on leveraging available commercial,*  
16 *academic, and other non-Federal environmental data*  
17 *to enhance coordination across the private, public,*  
18 *and academic sectors of the United States weather en-*  
19 *terprise; and*

20           (2) *establish memoranda of understanding with*  
21 *networks outside of the scope of the Program.*

22           (b) *PROGRAM ELEMENTS.*—*The Program shall carry*  
23 *out the following activities:*

24           (1) *Improve environmental observations used by*  
25 *the National Oceanic and Atmospheric Administra-*

1        *tion and the National Weather Service to support*  
2        *baseline forecasts, including nowcasts, and warnings*  
3        *that protect the Nation’s citizens, businesses, military,*  
4        *and government agencies, and enable such individuals*  
5        *and entities to operate in safe, efficient, and orderly*  
6        *manners.*

7            *(2) When demonstrably cost effective and meeting*  
8        *or exceeding agency data quality standards, leverage*  
9        *existing networks of environmental monitoring sta-*  
10       *tions, including supplemental radar systems, to in-*  
11       *crease the quantity and density of environmental ob-*  
12       *servations and data available to the Administration.*

13           *(3) Establish means to integrate greater density*  
14       *and type of environmental observations into the Pro-*  
15       *gram on an annual basis, including by encouraging*  
16       *local and regional networks of environmental moni-*  
17       *toring stations, in situ sensor networks and satellite*  
18       *constellations to participate in the Program.*

19           *(4) Yield increased quantities of boundary-layer*  
20       *data to improve numerical weather prediction per-*  
21       *formance, including regarding subseasonal to seasonal*  
22       *timescales.*

23           *(5) Provide the critical technical and adminis-*  
24       *trative infrastructure needed to facilitate rapid inte-*  
25       *gration and sustained use of new and emerging net-*

1 *works of environmental monitoring stations antici-*  
2 *ipated in coming years from non-Federal sources.*

3 *(6) Expand and enhance environmental observa-*  
4 *tional networks in the roadway environment to pro-*  
5 *vide real-time road weather and surface conditions for*  
6 *surface transportation and related economic sectors.*

7 *(7) Identify available terrestrial or marine envi-*  
8 *ronmental data, or quantifiable gaps in such data, to*  
9 *improve the understanding of air-sea interactions.*

10 *(8) Support the National Weather Service in*  
11 *reaching its target of a 30-minute warning time for*  
12 *severe weather through better predictive model algo-*  
13 *rithms driven by increasingly effective observations.*

14 *(9) Coordinate with existing Administration*  
15 *data used for forecasts, including data from the Na-*  
16 *tional Environmental Satellite, Data, and Informa-*  
17 *tion Service, the Integrated Ocean Observing System,*  
18 *the Global Ocean Monitoring and Observing Program,*  
19 *the National Data Buoy Center, and the National*  
20 *Ocean Service.*

21 *(10) Identify and communicate to the Office of*  
22 *Oceanic and Atmospheric Research and other part-*  
23 *ners priorities of research and development needed to*  
24 *advance observations in the Program.*

1           (11) *Support the National Coordinated Soil*  
2 *Moisture Monitoring Network in acquiring soil mois-*  
3 *ture and related data to support the development of*  
4 *decision-support products and other information serv-*  
5 *ices.*

6           (c) *FINANCIAL AND TECHNICAL ASSISTANCE.*—

7           (1) *IN GENERAL.*—*In furtherance of the Pro-*  
8 *gram, the Under Secretary may, to the extent*  
9 *amounts are made available, award up to 15 percent*  
10 *of the Program’s annual appropriations for financial*  
11 *assistance to State, Tribal, private, and academic en-*  
12 *tities seeking to build, expand, or upgrade equipment*  
13 *and capacity of mesonet systems. Financial assistance*  
14 *under this subsection may be made in coordination*  
15 *with and in addition to awards from other Federal*  
16 *agencies.*

17           (2) *AGREEMENTS.*—*Before receiving financial*  
18 *assistance under paragraph (1), the State, Tribal,*  
19 *private, or academic entity seeking financial assist-*  
20 *ance under this subsection shall enter into an agree-*  
21 *ment with the Under Secretary to provide data to the*  
22 *Program, subject to verification by the Program of the*  
23 *relative operational value and evaluation of the cost*  
24 *of such data, for use in weather prediction, severe*  
25 *weather warnings, and emergency response.*

1           (3) *ASSISTANCE AND OTHER SUPPORT.*—The  
2           Under Secretary may provide technical assistance,  
3           project implementation support, and guidance to  
4           State, Tribal, private, and academic entities seeking  
5           financial assistance under this subsection. The Under  
6           Secretary may provide technical and financial assist-  
7           ance for maintenance of monitoring stations in  
8           underrepresented or remote areas of the country where  
9           it is financially unfeasible for one entity to operate  
10          such stations without such assistance.

11          (4) *TERMS.*—In providing financial assistance  
12          under this subsection, the Under Secretary shall es-  
13          tablish terms to ensure that each State, Tribal, pri-  
14          vate, or academic entity that receives financial assist-  
15          ance under this subsection receives a level of Federal  
16          support commensurate with the quality and other  
17          characteristics of the data to be provided.

18          (5) *DETERMINATION.*—A State, Tribal, private,  
19          or academic entity may receive financial assistance  
20          under this subsection only if the Under Secretary de-  
21          termines such entity shall provide sufficient non-Fed-  
22          eral financial support and full maintenance to main-  
23          tain the quality of the mesonet system and associated  
24          data standards required by the Program for a period  
25          of not less than five years.

1           (6) *PRIORITY.*—*The Under Secretary shall*  
2 *prioritize providing assistance under paragraph (1)*  
3 *to at least one entity in an underrepresented or re-*  
4 *mote area.*

5           (d) *ADVISORY COMMITTEE.*—

6           (1) *IN GENERAL.*—*The Under Secretary shall en-*  
7 *sure the Program has an active advisory committee of*  
8 *subject matter experts to make recommendations to*  
9 *the National Oceanic and Atmospheric Administra-*  
10 *tion on the identification, implementation, procure-*  
11 *ment, and tracking of data needed to supplement the*  
12 *Program, and recommend improvements, expansions,*  
13 *and acquisitions of available data. The Under Sec-*  
14 *retary may designate an existing Federal advisory*  
15 *committee, subcommittee, or working group, includ-*  
16 *ing, if appropriate, the Science Advisory Board of the*  
17 *National Oceanic and Atmospheric Administration,*  
18 *to carry out this subsection.*

19           (2) *ACADEMIC EXPERTISE.*—*The advisory com-*  
20 *mittee under paragraph (1), in consultation with the*  
21 *Program, shall include expertise from one or more in-*  
22 *stitutions of higher education (as such term is defined*  
23 *in section 101 of the Higher Education Act of 1965*  
24 *(20 U.S.C. 1001)) to assist the advisory committee to*  
25 *identify, evaluate, and recommend potential partner-*

1        *ships, regional or subregional consortia, and collabo-*  
2        *rative methods that would expand the number of par-*  
3        *ticipants and volume of data in the Program.*

4        *(e) REGULAR REPORTING.—The Under Secretary shall*  
5        *provide regular briefings, not less than twice annually, to*  
6        *the Committee on Science, Space, and Technology of the*  
7        *House of Representatives and the Committee on Commerce,*  
8        *Science, and Transportation of the Senate on all Program*  
9        *activities. Such briefings shall include information relating*  
10       *to the following:*

11                *(1) Efforts to implement the activities described*  
12                *in subsection (b).*

13                *(2) Any financial or technical assistance pro-*  
14                *vided pursuant to subsection (c).*

15                *(3) Efforts to address recommendations received*  
16                *from the advisory committee under subsection (d).*

17                *(4) The potential need and associated benefits of*  
18                *a coastal and ocean mesonet, or other emerging areas*  
19                *of weather data needs.*

20                *(5) Progress toward eliminating gaps in weather*  
21                *observation data by States and regions of the United*  
22                *States.*

23                *(6) Any other topic the Under Secretary deter-*  
24                *mines relevant.*

1           (f) *AUTHORIZATION OF APPROPRIATIONS.*—From  
2 *amounts made available to the National Weather Service,*  
3 *the Under Secretary, to carry out this section, shall allocate*  
4 *up to the following amounts for each specified fiscal year:*

5                   (1) *\$50,000,000 for fiscal year 2024.*

6                   (2) *\$55,000,000 for fiscal year 2025.*

7                   (3) *\$61,000,000 for fiscal year 2026.*

8                   (4) *\$68,000,000 for fiscal year 2027.*

9                   (5) *\$70,000,000 for fiscal year 2028.*

10 ***SEC. 504. NATIONAL COORDINATED SOIL MOISTURE MONI-***  
11 ***TORING NETWORK.***

12           (a) *IN GENERAL.*—The Under Secretary, in collabora-  
13 *tion with the Secretary of Agriculture, the Director of the*  
14 *United States Geological Survey, the Administrator of the*  
15 *National Aeronautics and Space Administration, and the*  
16 *heads of other relevant Federal agencies and departments,*  
17 *shall support the development, deployment, and mainte-*  
18 *nance of soil moisture monitoring networks by managing*  
19 *the National Coordinated Soil Moisture Monitoring Net-*  
20 *work (in this section referred to as the “Network”) within*  
21 *the National Integrated Drought Information System.*

22           (b) *ACTIVITIES.*—The Under Secretary shall ensure the  
23 *Network includes activities that carry out the following:*

24                   (1) *Establishing a visible, user-friendly website.*

1           (2) *Developing a set of criteria for high-quality*  
2 *data sources.*

3           (3) *Supporting research necessary to develop or*  
4 *improve soil moisture monitoring products at a na-*  
5 *tional scale.*

6           (4) *Increasing the number of long-term, high-*  
7 *quality, in situ and remote sensing soil moisture*  
8 *monitoring stations across the United States.*

9           (5) *Sharing methodologies and validation proto-*  
10 *cols with the private sector.*

11           (6) *Engaging with the citizen science commu-*  
12 *nity.*

13           (7) *Developing, releasing, and promoting new,*  
14 *nationwide point-based and gridded soil moisture*  
15 *data products that meet the needs of diverse end-user*  
16 *groups.*

17           (8) *Supporting community building and out-*  
18 *reach to the network of individuals engaged with soil*  
19 *moisture information delivery, from data provision to*  
20 *end-user decision making.*

21 **SEC. 505. NATIONAL WATER CENTER.**

22           *Section 301 of the Coordinated Ocean Observations*  
23 *and Research Act of 2020 (42 U.S.C. 10371) is amended—*

24           (1) *in subsection (a)—*

25                   (A) *in paragraph (1)(A)—*

1           *(i) in the matter preceding clause (i),*  
2           *by inserting “as a component of the Na-*  
3           *tional Centers for Environmental Pre-*  
4           *dition” after “center”;*

5           *(ii) in clause (i), by striking “and”*  
6           *after the semicolon;*

7           *(iii) in clause (ii), by striking the pe-*  
8           *riod and inserting “; and”;* and

9           *(iv) by adding at the end the following*  
10          *new clause:*

11           *“(iii) to provide service backup capa-*  
12           *bilities and additional mission support*  
13           *services for River Forecast Centers.”;* and

14          *(B) in paragraph (2), by adding at the end*  
15          *the following new subparagraph:*

16           *“(F) Serving as the primary Center for col-*  
17           *laboration and coordination of the National Oce-*  
18           *anic and Atmospheric Administration’s water*  
19           *research and operational activities with existing*  
20           *Federal centers and networks, including the De-*  
21           *partment of Agriculture, the Army Corps of En-*  
22           *gineers, the Bureau of Reclamation, the United*  
23           *States Geological Survey, and the Federal Emer-*  
24           *gency Management Agency.”;*

1           (2) *by striking subsection (b) and redesignating*  
2           *subsections (c) through (e) as subsections (b) through*  
3           *(d) respectively; and*

4           (3) *by amending subsection (c), as so redesign-*  
5           *ated, to read as follows:*

6           “(c) *AUTHORIZATION OF APPROPRIATIONS.—There is*  
7           *authorized to be appropriated \$46,000,000 for each of fiscal*  
8           *years 2024 through 2028 to carry out this section.”.*

9           **SEC. 506. SATELLITE TRANSFERS REPORT.**

10           *Not later than 180 days after the date of the enactment*  
11           *of this Act, the Secretary of Commerce shall submit to the*  
12           *Committee on Commerce, Science, and Transportation of*  
13           *the Senate and the Committee on Science, Space, and Tech-*  
14           *nology of the House of Representatives a report describing*  
15           *the Department of Commerce’s authorities, policies, and*  
16           *Federal Government-wide policies related to transferring*  
17           *any portion of the weather satellite systems operated by the*  
18           *Department of Commerce to any other Federal department*  
19           *or agency. The report shall also include the following:*

20           (1) *A description of the process for decommis-*  
21           *sioning a Department of Commerce operational*  
22           *weather satellite, any existing agreements related to*  
23           *transfers of weather satellites, whether decommis-*  
24           *sioned or not, and any reimbursable agreements re-*  
25           *lated to the transfer of physical property or the oper-*

1        *ation of Department of Commerce weather satellites*  
 2        *on behalf of any other Federal department or agency.*

3            *(2) A summary of any Department of Commerce*  
 4        *plans for potential transfer of existing or future*  
 5        *weather satellite systems to any other Federal depart-*  
 6        *ment or agency.*

7        **SEC. 507. PRECIPITATION FORECAST IMPROVEMENT PRO-**  
 8            **GRAM.**

9            *(a) IN GENERAL.—Title VI of the Weather Research*  
 10        *and Forecasting Innovation Act of 2017 (15 U.S.C. 8501*  
 11        *et seq.) is amended—*

12            *(1) by redesignating section 603 as section 604;*  
 13        *and*

14            *(2) by inserting after section 602 the following*  
 15        *new section:*

16        **“SEC. 603. PRECIPITATION FORECAST IMPROVEMENT PRO-**  
 17            **GRAM.**

18            *“(a) IN GENERAL.—The Under Secretary, in collabo-*  
 19        *ration with the United States weather industry, other Fed-*  
 20        *eral agencies, and academic partners, shall maintain a pro-*  
 21        *gram to improve precipitation forecasting across timescales.*

22            *“(b) GOAL.—The goal of the program under subsection*  
 23        *(a) shall be to provide more accurate, reliable, and timely*  
 24        *precipitation forecasts across timescales through the devel-*  
 25        *opment and application of a fully coupled Earth system*

1 *prediction model in order to reduce the loss of life or prop-*  
2 *erty related to precipitation extremes, with a focus on the*  
3 *following:*

4           “(1) *Improving the understanding and pre-*  
5 *diction of precipitation extremes from a variety of*  
6 *weather systems, including atmospheric rivers.*

7           “(2) *Evaluating and incorporating, as appro-*  
8 *priate, innovative observations into operational moni-*  
9 *toring and forecast systems to improve precipitation*  
10 *forecasts.*

11           “(3) *Improving earth system model predictions*  
12 *of precipitation extremes from atmospheric rivers,*  
13 *tropical cyclones, summer-time thunderstorms, winter*  
14 *storms, and other phenomena, in coordination with*  
15 *relevant programs.*

16           “(4) *Enhancing research transition to operations*  
17 *through testbeds, including the evaluation of physical*  
18 *and social science, technology, and other research to*  
19 *develop products and services for implementation and*  
20 *use by relevant stakeholders.*

21           “(5) *Incorporating social, behavioral, and eco-*  
22 *nomic sciences best practices into operations for more*  
23 *effective and actionable watch and warning products*  
24 *that help drive public safety and damage mitigation*

1       *decisions in coordination with the programs estab-*  
2       *lished in accordance with this Act.*

3               “(6) *Ensuring data and metadata management*  
4       *processes are in place to support data access and ar-*  
5       *chive for long term research and operations among*  
6       *multiple partners.*

7               “(c) *ACTIVITIES.—In carrying out the program under*  
8       *subsection (a), the Under Secretary shall support research-*  
9       *to-operations work, including relating to the following:*

10               “(1) *Implementing key strategies and following*  
11       *priorities and objectives outlined by the National Oce-*  
12       *anic and Atmospheric Administration’s ‘Precipitation*  
13       *Prediction Grand Challenge Strategy’.*

14               “(2) *Improving the physical science, operational*  
15       *modeling and tools, and technology related to better*  
16       *forecasting precipitation extremes across timescales.*

17               “(3) *Improving the social, behavioral, risk, com-*  
18       *munications, and economic sciences related to*  
19       *vulnerabilities, risk communication, and delivery of*  
20       *information critical for reducing the loss of life or*  
21       *property related to extreme precipitation.*

22               “(4) *Conducting the research necessary to de-*  
23       *velop and deploy probabilistic weather forecast guid-*  
24       *ance technology relating to precipitation extremes in*  
25       *operational practice.*

1           “(5) *Enhancing the operational capacity of the*  
2           *National Weather Service to deliver decision support*  
3           *for increasing precipitation extremes.*

4           “(6) *Expanding computational resources to im-*  
5           *prove precipitation modeling.*

6           “(d) *ANNUAL BUDGET.—The Under Secretary shall,*  
7           *not less frequently than annually, submit to Congress a pro-*  
8           *posed budget corresponding with carrying out this section.”.*

9           “(b) *CLERICAL AMENDMENT.—The table of contents in*  
10          *section 1(b) of the Weather Research and Forecasting Inno-*  
11          *vation Act of 2017 is amended by striking the item relating*  
12          *to section 603 and inserting the following new items:*

          “*Sec. 603. Precipitation forecast improvement program.*

          “*Sec. 604. Definitions.”.*



Union Calendar No. 247

118<sup>TH</sup> CONGRESS  
1<sup>ST</sup> Session

**H. R. 6093**

[Report No. 118-3061]

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## **A BILL**

To improve the National Oceanic and Atmospheric Administration's weather research, support improvements in weather forecasting and prediction, expand commercial opportunities for the provision of weather data, and for other purposes.

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DECEMBER 11, 2023

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed