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2D SESSION

H. R. 6093

IN THE SENATE OF THE UNITED STATES

MAY 1, 2024

Received; read twice and referred to the Committee on Commerce, Science,
and Transportation

AN ACT

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,*

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

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

6 (b) **TABLE OF CONTENTS.**—The table of contents for
 7 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
 (VORTEX).
 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 Preparedness Act reauthorization.
 Sec. 116. Amendments to 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 en-
 4 terprise”, “weather data”, and “weather industry” have
 5 the meanings given such terms in section 2 of the Weather
 6 Research and Forecasting Innovation Act of 2017 (15
 7 U.S.C. 8501).

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

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

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

3 “(5) WEATHER DATA.—The term ‘weather
4 data’ means information used to track and predict
5 weather conditions and patterns, including forecasts,
6 observations, and derivative products from such in-
7 formation.”.

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

12 **SEC. 101. PUBLIC SAFETY PRIORITY.**

13 Section 101 of the Weather Research and Fore-
14 casting Innovation Act of 2017 (15 U.S.C. 8511) is
15 amended by adding at the end the following new sentence:

16 “The Under Secretary shall ensure the National Oceanic
17 and Atmospheric Administration remains focused on pro-
18 viding accurate and timely weather forecasts that protect
19 lives and property and enhance the national economy by
20 disseminating to the public and core partners through
21 nimble, flexible, and mobile methods critical weather infor-
22 mation and impact-based decision support services.”.

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

3 Section 110 of the Weather Research and Fore-
4 casting Innovation Act of 2017 (15 U.S.C. 8519) is
5 amended to 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 weath-
14 er 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 tor-
18 nado, severe storm, and next generation radar
19 research; and

20 “(D) \$15,000,000 is authorized for the
21 joint technology transfer initiative described in
22 section 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 weath-
26 er 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 tor-
4 nado, severe storm, and next generation radar
5 research; and

6 “(D) \$15,150,000 is authorized for the
7 joint technology transfer initiative described in
8 section 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 weath-
12 er 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 tor-
16 nado, severe storm, and next generation radar
17 research; and

18 “(D) \$15,302,000 is authorized for the
19 joint technology transfer initiative described in
20 section 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 weath-
24 er 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 tor-
4 nado, severe storm, and next generation radar
5 research; and

6 “(D) \$15,455,000 is authorized for the
7 joint technology transfer initiative described in
8 section 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 weath-
12 er 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 tor-
16 nado, severe storm, and next generation radar
17 research; and

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

21 “(b) LIMITATION.—No additional funds are author-
22 ized to carry out this title or the amendments made by
23 this 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 sub-
15 section (a) shall be to develop and extend accurate tornado
16 forecasts, predictions, and warnings in order to reduce the
17 loss of life or property related to tornadoes, with a focus
18 on the following:

19 “(1) Improving the effectiveness and timeliness
20 of 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
3 technologies, observation tools or networks, crewed or
4 uncrewed systems, and hosted instruments on commercial
5 aircrafts, vessels, and satellites, with respect to the im-
6 provement of 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 Atmos-
12 pheric Administration’s 2019 report, ‘Tornado
13 Warning Improvement and Extension Program
14 Plan’.

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

22 “(3) Improving the physical sciences, computer
23 modeling, and tools related to tornado formation, the
24 impacts of tornadoes on the built and natural envi-

1 ronment, and the interaction of tornadoes and hurri-
2 canes.

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

6 “(1) conduct and transition to operations the
7 research necessary to develop and deploy prob-
8 abilistic weather forecast guidance technology for
9 tornadoes and related weather phenomena;

10 “(2) incorporate into tornado modeling and
11 forecasting, as appropriate, social, behavioral, risk,
12 communication, and economic sciences;

13 “(3) enhance workforce training on radar inter-
14 pretation and use of tornado warning systems; and

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

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

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

1 “(2) determine whether updates to such system
 2 are required to ensure such ratings accurately reflect
 3 the severity of tornados; and

4 “(3) if determined necessary, update such sys-
 5 tem.

6 “(g) ANNUAL BUDGET.—The Under Secretary shall,
 7 not less frequently than annually, submit to Congress a
 8 proposed budget corresponding with carrying out this sec-
 9 tion.”.

10 (b) CLERICAL AMENDMENT.—The table of contents
 11 in section 1(b) of the Weather Research and Forecasting
 12 Innovation Act of 2017 is amended by amending the item
 13 relating to section 103 to read as follows:

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

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

16 Section 104 of the Weather Research and Fore-
 17 casting Innovation Act of 2017 (15 U.S.C. 8514) is
 18 amended to read as follows:

19 **“SEC. 104. HURRICANE FORECAST IMPROVEMENT PRO-**
 20 **GRAM.**

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

1 “(b) GOAL.—The goal of the program under sub-
2 section (a) shall be to develop and extend accurate hurri-
3 cane forecasts, predictions, and warnings in order to re-
4 duce the loss of life or property related to hurricanes, with
5 a focus on the following:

6 “(1) Improving the understanding and pre-
7 diction of rapid intensity change and projected path
8 of hurricanes, including probabilistic methods for
9 hurricane hazard mapping.

10 “(2) Improving the forecast and impact-based
11 communication of inland flooding, compound flood-
12 ing, and storm surges from hurricanes, in coordina-
13 tion with the program established under section 205
14 of the Weather Act Reauthorization Act of 2023.

15 “(3) Incorporating social, behavioral, risk, com-
16 munication, and economic sciences to clearly inform
17 response to prevent the loss of life or property, such
18 as evacuation or shelter in place.

19 “(4) Evaluating and incorporating, as appro-
20 priate, innovative observations, such as novel sensor
21 technologies, observation tools or networks, crewed
22 or uncrewed systems, and hosted instruments on
23 commercial aircrafts, vessels, and satellites.

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

1 “(1) Implementing key strategies and following
2 priorities and objectives outlined by the National
3 Oceanic and Atmospheric Administration’s 2019 re-
4 port ‘Hurricane Forecast Improvement Program’.

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

13 “(3) Improving the physical sciences, oper-
14 ational modeling, and tools related to hurricane for-
15 mation, the impacts of wind and water-based hurri-
16 cane hazards on the built and natural environment,
17 and the interaction of hurricanes and tornadoes.

18 “(d) WARNINGS.—In carrying out subsection (a), the
19 Under Secretary, in coordination with the program estab-
20 lished under section 406, shall—

21 “(1) conduct and transition to operations the
22 research necessary to develop and deploy prob-
23 abilistic weather forecast guidance technology relat-
24 ing to hurricanes and related weather phenomena;

1 “(2) incorporate into hurricane modeling and
2 forecasting, as appropriate, social, behavioral, risk,
3 communication, and economic sciences research; and

4 “(3) expand computational resources to support
5 and improve higher-resolution operational modeling
6 of hurricanes and related weather phenomena.

7 “(e) ANNUAL BUDGET.—The Under Secretary shall,
8 not less frequently than annually, submit to Congress a
9 proposed budget corresponding with carrying out this sec-
10 tion.”.

11 **SEC. 105. TSUNAMI WARNING AND EDUCATION ACT REAU-**
12 **THORIZATION.**

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

19 (b) PURPOSES.—Section 803 of the Tsunami Warn-
20 ing and Education Act (33 U.S.C. 3202) is amended—

21 (1) in paragraph (2), by inserting “timeliness
22 and” before “accuracy”;

23 (2) in paragraph (7), by striking “and” after
24 the semicolon;

1 (3) in paragraph (8), by striking the period and
2 inserting “; and”; and

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

5 “(9) to ensure data and metadata are managed,
6 archived, and made available for operations, re-
7 search, education, and mitigation activities in ac-
8 cordance with section 305 of the Weather Research
9 and Forecasting Innovation Act of 2017.”.

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

13 (1) in subsection (b)—

14 (A) in paragraph (4), by inserting “, using
15 industry and scientific best practices,” after
16 “operational condition”;

17 (B) in paragraph (5)—

18 (i) in subparagraph (C), by striking
19 “global seismic network” and inserting
20 “Global Seismic Network”;

21 (ii) by redesignating subparagraphs
22 (D), (E), (F), and (G), as subparagraphs
23 (E), (F), (G), and (H), respectively; and

24 (iii) by inserting after subparagraph
25 (C) the following new subparagraph:

1 “(D) the global navigation satellite system
2 (GNSS) network;”;

3 (C) by amending paragraph (6) to read as
4 follows:

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

12 (D) in paragraph (7)—

13 (i) by amending the matter preceding
14 subparagraph (A) to read as follows: “in-
15 clude a cooperative effort among the Ad-
16 ministration, the United States Geological
17 Survey (USGS), the National Aeronautics
18 and Space Administration (NASA), and
19 the National Science Foundation (NSF)
20 under which the Director of USGS, the Di-
21 rector of the NSF, and the Administrator
22 of NASA shall—”;

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

1 (iii) by adding at the end the fol-
2 lowing new subparagraphs:

3 “(C) provide reliable and real-time support
4 for the GNSS network data streams from NSF,
5 NASA, and USGS maintained networks, and
6 supplement instrumentation coverage for rapid
7 earthquake assessment;

8 “(D) assess the data and information re-
9 lating to warning systems of collaborating agen-
10 cies for potential utilization in NOAA’s warning
11 system, taking into consideration advancement
12 in research and technology;

13 “(E) incorporate, as practicable, tsunami
14 notifications and warnings in the USGS Earth-
15 quake Early Warning System; and

16 “(F) incorporate, as practicable, prelimi-
17 nary analysis or data from the National Earth-
18 quake Information Center regarding the source
19 and magnitude of an offshore earthquake with-
20 in five minutes of detection;”;

21 (E) in paragraph (8)—

22 (i) by inserting “ and decision support
23 aides” after “graphical warning prod-
24 ucts,”; and

1 (ii) by inserting “-prone” after “tsu-
2 nami”;

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

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

7 (H) by adding at the end the following new
8 paragraph:

9 “(11) update tsunami inundation maps, models,
10 or other geographic products, in order to best sup-
11 port, as appropriate, relevant agencies with tsunami
12 mitigation and recovery activities.”;

13 (2) in subsection (c)—

14 (A) by striking paragraph (1) and redesign-
15 ating paragraphs (2) and (3) as paragraphs
16 (1) and (2), respectively; and

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

18 (i) by striking “the Atlantic Ocean,
19 including the Caribbean Sea and Gulf of
20 Mexico, that are determined—” and insert-
21 ing “the Pacific, Arctic, and Atlantic
22 Oceans, including the Caribbean Sea and
23 Gulf of Mexico, that are determined to
24 pose significant risks of tsunami for States

1 and United States territories along the
2 coastal areas of such regions; and”;

3 (ii) by striking subparagraphs (A) and
4 (B);

5 (3) by redesignating subsections (d), (e), (f),
6 and (g) as subsections (e), (f), (g), and (h), respec-
7 tively;

8 (4) by inserting after subsection (c) the fol-
9 lowing new subsection:

10 “(d) TSUNAMI WARNING ALERT LEVEL EVALUA-
11 TION.—The Administrator, in collaboration with social sci-
12 entists, emergency personnel, and high-risk communities,
13 shall—

14 “(1) evaluate tsunami alert levels terminology,
15 timing, and effectiveness;

16 “(2) determine if such alerts produce the de-
17 sired response and understanding from possible tsu-
18 nami-prone communities; and

19 “(3) if necessary, update the alert level system
20 for increased effectiveness.”;

21 (5) in subsection (e), as so redesignated—

22 (A) in paragraph (1)—

23 (i) in the matter preceding subpara-
24 graph (A), by inserting “responsible for
25 Alaska, the continental United States, Ha-

1 waii, United States territories, and inter-
2 national entities the Administrator deter-
3 mines appropriate” before the period;

4 (ii) in subparagraph (A), by striking
5 “which is primarily responsible for Alaska
6 and the continental United States”; and

7 (iii) in subparagraph (B), by striking
8 “, which is primarily responsible for Ha-
9 waii, the Caribbean, and other areas of the
10 Pacific not covered by the National Cen-
11 ter”;

12 (B) in paragraph (2)—

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

15 (ii) in subparagraph (B), by striking
16 “and volcanic eruptions” and inserting
17 “volcanic eruptions, or other sources”;

18 (iii) in subparagraph (C), by striking
19 “buoy data and tidal” and inserting “and
20 coastal”;

21 (iv) in subparagraph (E), by striking
22 “Integrated Ocean Observing System of
23 the Administration” and inserting “United
24 States and global ocean and coastal observ-
25 ing system”;

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

3 (vi) by amending subparagraph (I) to
4 read as follows:

5 “(I) Providing a Tsunami Warning Coordi-
6 nator to coordinate with partners and stake-
7 holders products and services of the centers
8 supported or maintained under paragraph (1).”;

9 (C) by amending paragraph (3) to read as
10 follows:

11 “(3) FAIL-SAFE WARNING CAPABILITY.—The
12 Administrator shall support and maintain fail-safe
13 warning capability for the tsunami warning centers
14 supported or maintained under paragraph (1), and
15 such centers shall conduct at least one service back
16 up drill biannually.”;

17 (D) in paragraph (4)—

18 (i) by amending the matter preceding
19 subparagraph (A) to read as follows: “The
20 Administrator shall coordinate with the
21 weather forecast offices of the National
22 Weather Service, the centers supported or
23 maintained under paragraph (1), and such
24 national and regional program offices of
25 the Administration as the Administrator or

1 the coordinating committee, as established
2 in section 805(b), consider appropriate to
3 ensure that regional and local weather
4 forecast offices—”;

5 (ii) in subparagraph (B), by striking
6 “and” after the semicolon;

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

9 (iv) by adding at the end the following
10 new subparagraph:

11 “(D) conduct education and outreach ef-
12 forts to help prepare coastal communities for
13 tsunami hazards.”;

14 (E) in paragraph (5)—

15 (i) in the section heading, by striking
16 “UNIFORM” and inserting “STANDARD-
17 IZED”;

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

20 (iii) in subparagraph (C)(ii), by strik-
21 ing “uniform” and inserting “standard-
22 ized”;

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

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

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

5 “(F) align the analytic techniques and
6 methodologies of the existing tsunami warning
7 centers supported or maintained under para-
8 graph (1) to ensure seamless continuity of oper-
9 ations and mitigate risk of operational failure
10 by prioritizing investments that include—

11 “(i) replacing end of life equipment;

12 “(ii) ensuring product consistency;

13 “(iii) enabling consistent operational
14 process for backup capabilities;

15 “(iv) mitigating existing operational
16 security risks; and

17 “(v) meeting information security re-
18 quirements specified in chapter 35 of title
19 44, United States Code.”; and

20 (F) by adding at the end the following new
21 paragraph:

22 “(7) REPORTING.—Not later than 180 days
23 after the date of the enactment of this paragraph
24 and annually thereafter until such time as all rel-
25 evant requirements have been satisfied, the Adminis-

1 trator shall provide to the Committee on Science,
2 Space, and Technology of the House of Representa-
3 tives and the Committee on Commerce, Science, and
4 Transportation of the Senate an update briefing on
5 the progress of the following:

6 “(A) Standardizing products and proce-
7 dures under paragraph (5), including tsunami
8 assessments, forecast guidance, and related
9 products.

10 “(B) Migrating the message generation
11 systems of the centers supported or maintained
12 under paragraph (1) to the Advanced Weather
13 Information Processing Systems, or successor
14 systems.

15 “(C) The structural reorganization effort,
16 if necessary, to align such centers’ organiza-
17 tional charts.

18 “(D) The expected timeline for the full
19 completion of standardizing such centers’ prod-
20 ucts and procedures.”;

21 (6) in subsection (f), as so redesignated—

22 (A) in paragraph (1)—

23 (i) in the matter preceding subpara-
24 graph (A), by inserting “detect, measure,
25 and” after “used to”;

1 (ii) in subparagraph (B), by striking
2 “and” after the semicolon;

3 (iii) in subparagraph (C), by striking
4 “and the Advanced National Seismic Sys-
5 tem” and inserting “the Advanced Na-
6 tional Seismic System, and the global navi-
7 gation satellite system (GNSS); and”;

8 (iv) by adding at the end the following
9 new subparagraph:

10 “(D) ensure research is coordinated with
11 tsunami warning operations;”; and

12 (B) in paragraph (3), by inserting “accord-
13 ing to industry best practices” before the pe-
14 riod; and

15 (7) in subsection (h)(2)(A), as so redesignated,
16 by striking “accuracy of the tsunami model used”
17 and inserting “timeliness and accuracy of the fore-
18 cast used to issue the warning”.

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

22 (1) in paragraph (5)—

23 (A) by redesignating subparagraphs (B),
24 (C), (D), (E), (F), and (G) as subparagraphs
25 (C), (D), (E), (F), (G), and (H), respectively;

1 (B) by inserting after subparagraph (A)
2 the following new subparagraph:

3 “(B) Coastal digital elevation models
4 (DEMs) to support the development of inunda-
5 tion maps.”; and

6 (C) by adding at the end the following new
7 subparagraphs:

8 “(I) Evaluation of the variation of inunda-
9 tion impact resulting from tsunami-driven sedi-
10 ment transport.

11 “(J) Evaluation of tsunami debris impact
12 on critical infrastructure (as such term is de-
13 fined in section 1016(e) of Public Law 107–56
14 (42 U.S.C. 5195c(e))) and lifelines.

15 “(K) High-resolution and high-quality dig-
16 ital elevation models needed for at-risk coast-
17 lines, ports, and harbors, particularly for re-
18 gions not covered by existing inundation
19 maps.”; and

20 (2) in paragraph (7)(C), by inserting “and be-
21 havioral” after “social”;

22 (e) TSUNAMI RESEARCH PROGRAM.—Section 806 of
23 the Tsunami Warning and Education Act (33 U.S.C.
24 3205) is amended—

25 (1) in subsection (a)—

1 (A) by striking “section 805(d)” and in-
2 serting “section 805(b)”;

3 (B) by inserting “and management” after
4 “data collection”;

5 (2) in subsection (b)—

6 (A) in paragraph (1), by inserting “deploy-
7 ment and” after “may include”;

8 (B) in paragraph (3), by striking “social
9 science research” and inserting “social and be-
10 havioral science research, including data collec-
11 tion,”;

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

14 (D) by redesignating paragraph (5) as
15 paragraph (7); and

16 (E) by inserting after paragraph (4) the
17 following new paragraphs:

18 “(5) develop decision support tools;

19 “(6) leverage and prioritize research opportuni-
20 ties; and”;

21 (3) by adding at the end the following new sub-
22 section:

23 “(c) RESEARCH AND DEVELOPMENT PLAN.—Not
24 later than 12 months after the date of the enactment of
25 this subsection and not less frequently than every 36

1 months thereafter, the Administrator, in consultation with
2 the Interagency Council for Advancing Meteorological
3 Services, shall develop a research and development and re-
4 search to operations plan to improve tsunami detection
5 and forecasting capabilities that—

6 “(1) identifies and prioritizes research and de-
7 velopment priorities to satisfy section 804;

8 “(2) identifies key research needs for better de-
9 tecting tsunamis that may occur in open ocean and
10 along the coastlines of the United States and its ter-
11 ritories, improve forecasting of tsunamis that are
12 not seismically driven, and other opportunities deter-
13 mined appropriate;

14 “(3) develops plans for transitioning research to
15 operations; and

16 “(4) identifies collaboration opportunities that
17 may further and align tsunami research, develop-
18 ment, warnings, and operations between the centers
19 supported or maintained under section 804, the Na-
20 tional Tsunami Hazard Mitigation Program, the Na-
21 tional Oceanic and Atmospheric Administration Cen-
22 ter for Tsunami Research, the National Science
23 Foundation, the United States Geological Survey,
24 the Federal Emergency Management Agency, insti-

1 tutions of higher education, private entities, stake-
2 holders, and others determined appropriate.”;

3 (f) GLOBAL TSUNAMI WARNING AND MITIGATION
4 NETWORK.—Section 807(d) of the Tsunami Warning and
5 Education Act (33 U.S.C. 3206(d)) is amended by insert-
6 ing “and management” after “data sharing”;

7 (g) TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY
8 PANEL.—Section 808(b)(1) of the Tsunami Warning and
9 Education Act (33 U.S.C. 3206a(b)(1)) is amended by in-
10 sserting “and behavioral” after “social”;

11 (h) AUTHORIZATION OF APPROPRIATIONS.—Section
12 809 of the Tsunami Warning and Education Act (33
13 U.S.C. 3207) is amended to read as follows:

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

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

18 “(1) not less than 27 percent of the amount ap-
19 propriated for each fiscal year shall be for activities
20 conducted at the State level under the national tsu-
21 nami hazard mitigation program under section 805;
22 and

23 “(2) not less than 8 percent of the amount ap-
24 propriated shall be for the tsunami research pro-
25 gram under section 806.”.

1 **SEC. 106. OBSERVING SYSTEM PLANNING.**

2 Section 106 of the Weather Research and Fore-
3 casting Innovation Act of 2017 (15 U.S.C. 8516) is
4 amended—

5 (1) in paragraph (3)—

6 (A) by inserting “Federal” before “observ-
7 ing capabilities”; and

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

9 (2) in paragraph (4)—

10 (A) by inserting “, including private sector
11 partnerships or commercial acquisition,” after
12 “options”; and

13 (B) by striking the period and inserting a
14 semicolon; and

15 (3) by adding at the end the following new
16 paragraphs:

17 “(5) compare costs and schedule, including
18 cost-benefit analysis, of Federal and private sector
19 supplemental options to fill the observation data re-
20 quirements under paragraph (1) and gaps identified
21 pursuant to paragraph (3); and

22 “(6) not later than one year after the date of
23 the enactment of this paragraph, submit to Congress
24 a report that provides an analysis of the technical,
25 schedule, cost, and cost benefit analyses to place an
26 operational polar-orbiting environmental satellite ca-

1 pability in the early morning orbit to support the
2 weather enterprise and the Administration’s mis-
3 sion.”.

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

5 Section 107 of the Weather Research and Fore-
6 casting Innovation Act of 2017 (15 U.S.C. 8517) is
7 amended—

8 (1) in subsection (b)(3), by striking “providing
9 data” and inserting “comparison to current or ex-
10 perimental commercial system capabilities that pro-
11 vide data”;

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

14 (3) by striking subsection (d); and

15 (4) by redesignating subsection (e) as sub-
16 section (d).

17 **SEC. 108. COMPUTING RESOURCES PRIORITIZATION.**

18 Section 108 of the Weather Research and Fore-
19 casting Innovation Act of 2017 (15 U.S.C. 8518) is
20 amended by striking subsection (a)(3)(C) and all that fol-
21 lows through subsection (b)(7) and inserting the following
22 new subsections:

23 “(b) COMPUTING RESEARCH INITIATIVE.—

24 “(1) IN GENERAL.—The Under Secretary, in
25 collaboration with the Secretary of Energy, shall

1 carry out an initiative, which may leverage Depart-
2 ment of Energy high performance computers, cloud
3 computing, or expertise, to run advanced coupled
4 models in order to conduct proof of concept sce-
5 narios in comparison with current issued forecasts
6 and models. The Under Secretary and Secretary of
7 Energy shall carry out the initiative through a com-
8 petitive, merit-reviewed process, and consider appli-
9 cations from Federal agencies, National Labora-
10 tories, institutions of higher education (as such term
11 is defined in section 101 of the Higher Education
12 Act of 1965 (20 U.S.C. 1001)), nonprofit institu-
13 tions, and other appropriate entities (or a consortia
14 thereof).

15 “(2) COMPONENTS.—In carrying out the initia-
16 tive under paragraph (1), the Under Secretary shall
17 prevent duplication and coordinate research efforts
18 in artificial intelligence, high performance com-
19 puting, cloud computing, quantum computing, mod-
20 eling and simulation, machine learning, data assimi-
21 lation, large scale data analytics, and predictive
22 analysis across the National Oceanic and Atmos-
23 pheric Administration, and may—

24 “(A) conduct research to compare National
25 Weather Service forecast and model outputs to

1 predictions and model outputs developed
2 through such initiative;

3 “(B) share relevant modeling system and
4 applications innovations developed through such
5 initiative, including Unified Forecast System-
6 based applications, through community-based
7 activities, in accordance with section 10601 of
8 the James M. Inhofe National Defense Author-
9 ization Act for Fiscal Year 2023 (15 U.S.C.
10 8512a);

11 “(C) leverage coordinating activities man-
12 aged by the National Science and Technology
13 Council, the Interagency Council for Advancing
14 Meteorological Services, and other relevant
15 interagency entities;

16 “(D) provide sufficient capacity for long-
17 term archive and access of model output to sup-
18 port research and long-term study;

19 “(E) determine computing decisions based
20 on an agile requirements framework; and

21 “(F) support the training, recruitment,
22 and retention of the next generation weather,
23 water, and climate computing workforce
24 through incentives and pathways for career de-
25 velopment and employment opportunities.

1 “(3) RESEARCH SECURITY.—The activities au-
2 thorized under this section shall be applied in a
3 manner consistent with subtitle D of title VI of the
4 Research and Development, Competition, and Inno-
5 vation Act (enacted as division B of Public Law
6 117–167; 42 U.S.C. 19231 et seq.).

7 “(4) TERMINATION.—The authority under this
8 subsection shall terminate five years after the date
9 of the enactment of this subsection.

10 “(c) ARTIFICIAL INTELLIGENCE INVESTMENTS.—
11 The Under Secretary shall leverage artificial intelligence
12 and machine learning technologies to facilitate, optimize,
13 and further leverage advanced computing to accomplish
14 critical missions of the National Oceanic and Atmospheric
15 Administration by enhancing existing and forthcoming
16 high-performance and cloud computing infrastructure or
17 systems.

18 “(d) CENTERS OF EXCELLENCE.—The Under Sec-
19 retary may expand, and where applicable establish, centers
20 of excellence to aid the adoption of next-generation artifi-
21 cial intelligence and machine learning enabled advanced
22 computing capabilities. Each such center may carry out
23 activities that include the following:

24 “(1) Leveraging robust public-private partner-
25 ship models to provide access to training, experience,

1 and long-term development of workforce and infra-
2 structure.

3 “(2) Developing and optimizing tools, libraries,
4 algorithms, data structures, and other supporting
5 software necessary for specific applications on high
6 performance computing systems.

7 “(3) Applying modern artificial intelligence,
8 deep machine-learning, and advanced data analysis
9 technologies to address current and future mission
10 challenges.

11 “(4) To the maximum extent practicable, ex-
12 plore quantum computing and related application
13 partnerships with public, private, and academic enti-
14 ties to improve the accuracy and resolution of weath-
15 er predictions.

16 “(e) MULTI-YEAR CONTRACTS.—The Under Sec-
17 retary may enter into multi-year contracts in accordance
18 with section 3903 of title 41, United States Code, and
19 shall ensure compliance with all clauses provided in such
20 section to support operations, research, and development
21 related to high performance and cloud computing infra-
22 structure or systems with an unfunded contingent liability
23 in the event of cancellation.

24 “(f) REPORT.—Not later than two years after the
25 date of the enactment of this subsection, the Under Sec-

1 retary shall submit to the Committee on Science, Space,
2 and Technology of the House of Representatives and the
3 Committee on Commerce, Science, and Transportation
4 and the Committee on Energy and Natural Resources of
5 the Senate a report evaluating the following:

6 “(1) The effectiveness of the initiative required
7 under subsection (b), including applied research dis-
8 coveries and advanced modeling improvements
9 achieved.

10 “(2) A best estimate of the overall value of
11 high-resolution probabilistic forecast guidance for
12 hazardous weather or water events (as such term is
13 defined in section 406) using a next-generation
14 weather forecast and warning framework.

15 “(3) The needs for cloud computing, quantum
16 computing, or high-performance computing, visual-
17 ization, and dissemination collaboration between the
18 Department of Energy and the National Oceanic
19 and Atmospheric Administration.

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

22 “(A) High-resolution numerical weather
23 prediction models.

24 “(B) Methods for meeting the cloud com-
25 puting, quantum computing, or high-perform-

1 ance computing, visualization, and dissemina-
2 tion needs identified under paragraph (3).”.

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

4 Paragraph (5) of section 102(b) of the Weather Re-
5 search and Forecasting Innovation Act of 2017 (15 U.S.C.
6 8512(b)) is amended—

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

9 (2) by striking subparagraph (E) and inserting
10 the following new subparagraphs:

11 “(E) developing community weather re-
12 search modeling systems that—

13 “(i) are accessible by the public in ac-
14 cordance with section 10601 of the James
15 M. Inhofe National Defense Authorization
16 Act for Fiscal Year 2023 (15 U.S.C.
17 8512a) and available for archive and long-
18 term study;

19 “(ii) meet basic end-user requirements
20 for running on public computers and net-
21 works located outside of secure National
22 Oceanic and Atmospheric Administration
23 information and technology systems;

24 “(iii) utilize, whenever appropriate
25 and cost-effective, innovative strategies and

1 methods, including cloud-based computing
2 capabilities, for hosting and management
3 of part or all of the system described in
4 this subparagraph;

5 “(iv) utilize modeling systems that
6 allow for interoperability with new model
7 components, modules, and next-generation
8 software and coding languages;

9 “(v) allow for open testing and inte-
10 gration of promising operational model im-
11 provements from the broader community;

12 “(vi) access as close to a real-time
13 basis as possible operational data and
14 metadata, including commercially pur-
15 chased data for use in Earth Prediction
16 Innovation Center research and develop-
17 ment testing grounds pursuant to redis-
18 tribution restrictions, licensing agreements,
19 and applicable existing laws and regula-
20 tions; and

21 “(vii) provide supported and portable
22 versions of the unified forecast system, in-
23 cluding applications for hurricane, space
24 weather, ocean, cryosphere, air quality,
25 and coastal models, that can reproduce

1 current operational global and regional
2 model prediction; and

3 “(F) establishing a National Oceanic and
4 Atmospheric Administration Data Lake, to be
5 maintained by the Administration, a commercial
6 partner, or non-profit entity, that consolidates
7 and maintains a publicly available and continu-
8 ously updated collection of data and metadata
9 used in numerical weather prediction for use in
10 the Earth Prediction Innovation Center’s model
11 testing, pursuant to redistribution restrictions,
12 licensing agreements, and applicable existing
13 laws and regulations.”.

14 **SEC. 110. SATELLITE ARCHITECTURE PLANNING.**

15 Section 301 of the Weather Research and Fore-
16 casting Innovation Act of 2017 (15 U.S.C. 8531) is
17 amended—

18 (1) in subsection (a), by striking paragraph (1)
19 and redesignating paragraphs (2), (3), and (4) as
20 paragraphs (1), (2), and (3), respectively;

21 (2) by amending subsection (b) to read as fol-
22 lows:

23 “(b) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
24 ISTRATION SATELLITE SYSTEMS AND DATA.—

1 “(1) IN GENERAL.—The Under Secretary shall
2 maintain a fleet of Administration space-based ob-
3 servation platforms that provide critical operations-
4 focused data and information to support the Na-
5 tional Oceanic and Atmospheric Administration’s
6 mission to monitor the global environment in order
7 to protect lives and property from extreme weather
8 and other natural phenomena.

9 “(2) COLLABORATION.—The Under Secretary
10 shall implement recommendations from the NOAA
11 Observing Systems Council to ensure an appropriate
12 mix of government, academic, commercial sector,
13 and international partnerships in the provision of
14 data and information, including a broadened effort
15 on data acquisition through the Commercial Data
16 Program under section 302 when cost effective and
17 beneficial to the Administration.

18 “(3) PRIORITY.—The Under Secretary shall en-
19 sure that Administration platforms maintained
20 under paragraph (1) prioritize the development of
21 products and services that are tailored to meet the
22 National Oceanic and Atmospheric Administration’s
23 mission.

24 “(4) NATIONAL CENTERS FOR ENVIRONMENTAL
25 INFORMATION.—The Under Secretary shall maintain

1 the National Centers for Environmental Information
2 to provide a long-term archive and access to the Ad-
3 ministration’s national and global data and
4 metadata.”; and

5 (3) in subsection (f)(1), by striking “2023” and
6 inserting “2030”.

7 **SEC. 111. IMPROVING UNCREWED ACTIVITIES.**

8 Subparagraph (G) of section 102(b)(3) of the Weath-
9 er Research and Forecasting Innovation Act of 2017 (15
10 U.S.C. 8512(b)(3)) is amended by striking “, including
11 commercial observing systems” and inserting “, including
12 stationary and mobile commercial observing systems, such
13 as uncrewed aircraft and marine systems, to provide ob-
14 servations of the atmosphere and ocean, and other obser-
15 vations, in cooperation with the Office of Marine and Avia-
16 tion Operations”.

17 **SEC. 112. INTERAGENCY COUNCIL FOR ADVANCING METE-
18 OROLOGICAL SERVICES.**

19 (a) IN GENERAL.—Section 402 of the Weather Re-
20 search and Forecasting Innovation Act of 2017 (15 U.S.C.
21 8542) is amended—

22 (1) in subsection (a)—

23 (A) by striking “Advancing Weather Serv-
24 ices” and inserting “Advancing Meteorological

1 Services (in this section referred to as the
2 ‘Interagency Council’); and

3 (B) by striking “Committee” each place it
4 appears and inserting “Council”;

5 (2) by amending subsections (b) and (c) to read
6 as follows:

7 “(b) CO-CHAIRS.—The Director of the Office of
8 Science and Technology Policy and the Under Secretary
9 shall serve as co-chairs of the Interagency Council. The
10 Under Secretary shall serve as the Federal Coordinator
11 for Meteorology.

12 “(c) FURTHER COORDINATION.—The Director of the
13 Office of Science and Technology Policy shall take such
14 steps as are necessary to coordinate the activities of the
15 Federal Government with stakeholders in the United
16 States weather industry, academic partners, State govern-
17 ments, and emergency managers, including by imple-
18 menting mechanisms to encourage and enable the partici-
19 pation of non-Federal employees in the functions of the
20 Interagency Council.”;

21 (3) by adding at the end the following new sub-
22 sections:

23 “(d) FUNCTIONS.—The Interagency Council shall be
24 the formal mechanism by which all relevant Federal de-
25 partments and agencies coordinate implementation of pol-

1 icy and practices to ensure United States global leadership
2 in meteorological services. In doing so, the Interagency
3 Council shall review programs and support relevant weath-
4 er research and forecast innovation activities, as well as
5 other related implementation activities, related to Federal
6 meteorological services, including by carrying out the fol-
7 lowing:

8 “(1) Identifying and helping prioritize meteoro-
9 logical research and service delivery needs, including
10 relating to observations, operational systems, com-
11 munications, and infrastructure.

12 “(2) Providing recommendations to streamline
13 or consolidate activities and develop greater effi-
14 ciencies in cross-agency activities.

15 “(3) Leveraging Earth system science research
16 outcomes of the National Oceanic and Atmospheric
17 Administration, the National Aeronautics and Space
18 Administration, and other relevant Federal depart-
19 ments and agencies, including research outcomes re-
20 lated to the relevant recommended key science and
21 applications questions and priorities in the National
22 Academies of Sciences, Engineering, and Medicine’s
23 2018 report ‘Thriving on Our Changing Planet: A
24 Decadal Strategy for Earth Observation from

1 Space’, to understand and predict high-impact
2 weather phenomena.

3 “(4) Facilitating the expansion and strength-
4 ening of partnerships with private sector entities to
5 advance meteorological research, communications,
6 and computing in collaboration with the Earth sys-
7 tem science, service, and stakeholder communities.

8 “(5) Sharing information regarding meteorolog-
9 ical research improvement needs and science oppor-
10 tunities across relevant Federal departments and
11 agencies.

12 “(6) Providing advice to all relevant Federal de-
13 partments and agencies regarding potential collabo-
14 rations and expected level of resources needed to
15 maintain and operate the Interagency Council.

16 “(7) Enhancing communication and coordina-
17 tion and promoting sharing within relevant Federal
18 departments and agencies and across the Inter-
19 agency Council.

20 “(8) Developing, recruiting, and sustaining a
21 professional and diverse workforce for meteorological
22 research and services.

23 “(e) DATA INVENTORY.—The Interagency Council, in
24 coordination and avoidance of duplication with the United
25 States Group on Earth Observations, shall promote data

1 and metadata access and archive activities to increase ac-
2 cessibility, interoperability, and reusability by maintaining
3 a data inventory of meteorological observations. Not less
4 frequently than annually for a period of five years begin-
5 ning on the date of the enactment of this subsection, the
6 Interagency Council shall solicit updated information from
7 private sector entities identifying current and near future
8 sources of such data. Such data shall be made available
9 to member departments and agencies under subsection
10 (a).

11 “(f) COORDINATION OFFICE.—The Interagency Me-
12 teorological Coordination Office shall provide to the Inter-
13 agency Council such administrative and logistical support
14 as the Interagency Council may require, as determined by
15 the co-chairs.

16 “(g) COST SHARE.—Member departments and agen-
17 cies of the Interagency Council under subsection (a) may
18 provide reimbursable financial support to the Interagency
19 Meteorological Coordinating Office to enhance cost-shar-
20 ing and collaboration related to weather research and fore-
21 cast innovation activities.

22 “(h) REPORT.—Not later than one year after the
23 date of the enactment of this subsection and annually
24 thereafter, the Interagency Council shall publish a report
25 which identifies among member agencies the following:

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

3 “(2) Federal programs that acquire such data
4 from private sector entities.

5 “(3) Advancements in meteorological data col-
6 lection, assimilation, and forecasting that could im-
7 prove Federal programmatic operational capabilities.

8 “(4) Barriers to acquiring meteorological obser-
9 vations, data sources, and capabilities that could be
10 used to better meet Federal programmatic needs.”.

11 (b) REFERENCES.—Any reference to the Interagency
12 Committee for Advancing Weather Services in any law,
13 rule, regulation, paper, record, map, or other such docu-
14 ment of the United States shall be deemed to be a ref-
15 erence to the Interagency Council for Advancing Meteoro-
16 logical Services.

17 **SEC. 113. OCEAN OBSERVATIONS.**

18 Subsection (b) of section 12304 of the Integrated
19 Coastal and Ocean Observation System Act of 2009 (33
20 U.S.C. 3603) is amended by adding at the end the fol-
21 lowing new paragraph:

22 “(5) SHIPS OF OPPORTUNITY PILOT PRO-
23 GRAM.—

24 “(A) IN GENERAL.—The Administrator, in
25 coordination with the heads of relevant Federal

1 departments and agencies, shall, subject to rel-
2 evant regulations and certifications, maintain
3 pilot programs or projects to contract with re-
4 search or commercial ship operators for data
5 collection and assess the potential costs, bene-
6 fits, and viability of a global network of ocean
7 and atmospheric observing instruments oper-
8 ating on research or commercial ocean vessels,
9 including in the Arctic, in order to supplement
10 the Integrated Coastal, Great Lakes, and Ocean
11 Observation System in improving understanding
12 of coastal and ocean systems and their relation-
13 ships to human activities.

14 “(B) STANDARDS AND SPECIFICATIONS.—

15 The Administrator shall ensure that data ac-
16 quired through the pilot program established
17 pursuant to subparagraph (A) meets the most
18 recent standards and specifications required for
19 observation services and data as published pur-
20 suant to subsection (c) of section 302 of the
21 Weather Research and Forecasting Innovation
22 Act of 2017.

23 “(C) REPORT.—Not later than five years

24 after the date of the enactment of this para-
25 graph, the Administrator, in consultation with

1 the Secretary of Transportation, shall submit to
2 Congress a report on the requirements for a
3 global network of ocean and atmospheric instru-
4 ments operating on research or commercial
5 ocean vessels for measurement and data trans-
6 mission.

7 “(D) SUNSET.—This paragraph shall ter-
8minate on the earlier of—

9 “(i) September 30, 2029; or

10 “(ii) one year after the date on which
11 the report required under subparagraph
12 (B) is submitted by the Administrator.”.

13 **SEC. 114. CONSOLIDATION OF REPORTS.**

14 (a) WEATHER RESEARCH AND FORECASTING INNO-
15 VATION ACT OF 2017.—

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

18 (A) in section 102 (15 U.S.C. 8512), by
19 striking subsection (d);

20 (B) by amending section 105 (15 U.S.C.
21 8515) to read as follows:

22 **“SEC. 105. WEATHER RESEARCH AND DEVELOPMENT PLAN-
23 NING.**

24 “Not later than two years after the date of the enact-
25 ment of this section and not less frequently than semi-

1 annually thereafter, the Under Secretary, acting through
2 the Assistant Administrator for Oceanic and Atmospheric
3 Research, and in coordination with the Director of the Na-
4 tional Weather Service and the Assistant Administrator
5 for Satellite and Information Services, shall issue a re-
6 search and development and research to operations plan
7 to maintain United States leadership in numerical weather
8 prediction and forecasting that—

9 “(1) describes the forecasting skill and tech-
10 nology goals, objectives, expected budget, and
11 progress of the National Oceanic and Atmospheric
12 Administration in carrying out the program con-
13 ducted under section 102;

14 “(2) identifies and prioritizes specific research
15 and development activities, data collection and anal-
16 ysis, predictive modeling, demonstration of potential
17 operational forecast application, education, training,
18 and performance metrics, weighted to meet the oper-
19 ational weather and flood-event mission of the Na-
20 tional Weather Service to achieve a weather-ready
21 Nation;

22 “(3) describes how the program conducted
23 under section 102 will collaborate with Federal
24 agencies and departments, international partners,
25 and stakeholders, including the United States weath-

1 er industry and academic partners, and the role of
2 each in advancing weather forecasting and commu-
3 nication;

4 “(4) identifies, through consultation with the
5 National Science Foundation, the United States
6 weather industry, and academic partners, research
7 necessary to advance the scientific understanding of
8 weather processes and provide information to im-
9 prove weather warning and forecast systems in the
10 United States most effectively; and

11 “(5) describes how the National Oceanic and
12 Atmospheric Administration is advancing community
13 weather modeling.”;

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

15 (i) in subsection (a), by inserting
16 “the” after “Director of”; and

17 (ii) by amending subsection (d) to
18 read as follows:

19 “(d) ANNUAL BRIEFING.—Not less frequently than
20 once each year, the Under Secretary shall brief the Com-
21 mittee on Commerce, Science, and Transportation of the
22 Senate and the Committee on Science, Space, and Tech-
23 nology of the House of Representatives on participation
24 in the program under subsection (a) and shall highlight

1 any innovations that come from the interaction described
2 in subsection (b).”; and

3 (D) by striking sections 408 through 411
4 and section 414 and redesignating sections 412
5 and 413 as sections 408 and 409, respectively.

6 (2) CLERICAL AMENDMENTS.—The table of
7 contents in section 1(b) of the Weather Research
8 and Forecasting Innovation Act of 2017 is amended
9 by striking the items relating to sections 408
10 through 414 and inserting the following new items:

“Sec. 408. Weather enterprise outreach.

“Sec. 409. Hurricane hunter aircraft.”.

11 (b) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
12 ISTRATION AUTHORIZATION ACT OF 1992.—The National
13 Oceanic and Atmospheric Administration Authorization
14 Act of 1992 (Public Law 102–567) is amended—

15 (1) in section 106, by striking subsection (c)
16 (15 U.S.C. 1537); and

17 (2) in section 108 (15 U.S.C. 8520)—

18 (A) by striking subsection (b); and

19 (B) by redesignating subsection (c) as sub-
20 section (b).

21 **SEC. 115. NATIONAL LANDSLIDE PREPAREDNESS ACT RE-**
22 **AUTHORIZATION.**

23 The National Landslide Preparedness Act (43 U.S.C.
24 3101 et seq.) is amended—

1 (1) in section 3 (43 U.S.C. 3102)—

2 (A) in subsection (a)(3), by striking “pro-
3 tect” and inserting “contribute to protecting”;

4 (B) in subsection (b)(1)(C)(ii), by striking
5 “implement” and inserting “disseminate”;

6 (C) in subsection (c)(2), by adding at the
7 end the following:

8 “(J) The Administrator of the National
9 Aeronautics and Space Administration.”; and

10 (D) in subsection (h), by striking “2024”
11 and inserting “2029”; and

12 (2) in section 5 (43 U.S.C. 3104)—

13 (A) in subsection (a)—

14 (i) in paragraph (1)(A), by inserting
15 “and derivative” after “3D elevation”; and

16 (ii) in paragraph (2)(B)(i), by insert-
17 ing “, process, and integrate” after “ac-
18 quire”;

19 (B) in subsection (b)(3)—

20 (i) by redesignating subparagraphs
21 (D) and (E) as subparagraphs (E) and
22 (F), respectively; and

23 (ii) by inserting after subparagraph
24 (C) the following:

1 “(D) the 3D Hydrography Program Work-
2 ing Group;”;

3 (C) in subsection (d)(3), by striking “pub-
4 lically” and inserting “publicly”; and

5 (D) in subsection (e), by striking “2024”
6 and inserting “2029”.

7 **SEC. 116. AMENDMENTS TO HARMFUL ALGAL BLOOM AND**
8 **HYPOXIA RESEARCH AND CONTROL ACT OF**
9 **1998.**

10 (a) **ASSESSMENTS.**—Section 603 of the Harmful
11 Algal Bloom and Hypoxia Research and Control Act of
12 1998 (33 U.S.C. 4001) is amended—

13 (1) in subsection (a)—

14 (A) by redesignating paragraphs (13) and
15 (14) as paragraphs (14) and (15); and

16 (B) by inserting after paragraph (12) the
17 following new paragraph:

18 “(13) the Department of Energy;”;

19 (2) by striking subsections (b), (c), (d), (e), (h),
20 and (i) and redesignating subsections (f) and (g) as
21 subsections (b) and (c), respectively;

22 (3) in subsection (b), as so redesignated—

23 (A) in paragraph (1), by striking “coastal
24 waters including the Great Lakes” and insert-

1 ing “marine, estuarine, and freshwater sys-
2 tems”; and

3 (B) in paragraph (2)—

4 (i) by amending subparagraph (A) to
5 read as follows:

6 “(A) examine the causes and ecological con-
7 sequences of hypoxia on marine and aquatic species
8 in their natural environments, and socio-cultural or
9 economic costs of hypoxia, including impacts on food
10 safety and security;”;

11 (ii) by redesignating subparagraphs
12 (B) through (D) as subparagraphs (D)
13 through (F), respectively;

14 (iii) by inserting after subparagraph
15 (A) the following new subparagraphs:

16 “(B) examine the effect of other environmental
17 stressors on hypoxia;

18 “(C) evaluate alternatives for reducing, miti-
19 gating, and controlling hypoxia and its environ-
20 mental impacts;”;

21 (iv) in subparagraph (D), as so redesi-
22 gnated, by inserting “, social,” after “eco-
23 logical”; and

24 (v) in subparagraph (E), as so redesi-
25 gnated, by striking “hypoxia modeling and

1 monitoring data” and inserting “hypoxia
2 modeling, forecasting, and monitoring and
3 observation data”; and

4 (4) in subsection (c), as so redesignated, to
5 read as follows:

6 “(c) ACTION STRATEGY AND SCIENTIFIC ASSESS-
7 MENT FOR MARINE AND FRESHWATER HARMFUL ALGAL
8 BLOOMS.—

9 “(1) Not less often than once every 5 years, the
10 Task Force shall complete and submit to Congress
11 an action strategy, including a scientific assessment,
12 of harmful algal blooms in the United States (in this
13 Act referred to as the ‘Action Strategy’). Each such
14 Action Strategy, including scientific assessment,
15 shall examine both marine and freshwater harmful
16 algal blooms, including those in the Great Lakes and
17 upper reaches of estuaries, those in freshwater lakes
18 and rivers, and those that originate in freshwater
19 lakes or rivers and migrate to coastal waters.

20 “(2) Each Action Strategy under this sub-
21 section shall—

22 “(A) examine the causes and ecological
23 consequences, and the socio-cultural or eco-
24 nomic costs, including impacts food safety and
25 security, of harmful algal blooms;

1 “(B) examine the effect of other environ-
2 mental stressors on harmful algal blooms;

3 “(C) examine potential methods to prevent,
4 control, and mitigate harmful algal blooms and
5 the potential ecological, social, cultural, and
6 economic costs and benefits of such methods;

7 “(D) identify priorities for research needed
8 to advance techniques and technologies to de-
9 tect, predict, monitor, respond to, and minimize
10 the occurrence, duration, and severity of harm-
11 ful algal blooms, including recommendations to
12 eliminate significant gaps in harmful algal
13 bloom forecasting, monitoring, and observation
14 data;

15 “(E) evaluate progress made by, and the
16 needs of, Task Force activities and actions to
17 prevent, control, and mitigate harmful algal
18 blooms;

19 “(F) identify ways to improve coordination
20 and prevent unnecessary duplication of effort
21 among Federal departments and agencies with
22 respect to research on harmful algal blooms;

23 “(G) include regional chapters relating to
24 the requirements described in this paragraph in
25 order to highlight geographically and eco-

1 logically diverse locations with significant eco-
2 logical, social, cultural, and economic impacts
3 from harmful algal blooms; and

4 “(H) define methodology used to determine
5 ecological, social, cultural and economic impacts
6 from harmful algal blooms and hypoxia.”.

7 (b) CONSULTATIONS.—Section 102 of the Harmful
8 Algal Bloom and Hypoxia Amendments Act of 2004 (33
9 U.S.C. 4001a) is amended—

10 (1) by striking “the coastal”;

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

12 (3) by inserting “and” after “local govern-
13 ments,”; and

14 (4) by striking “with expertise in coastal zone
15 science and management” and inserting “with rel-
16 evant expertise”.

17 (c) NATIONAL HARMFUL ALGAL BLOOM AND HY-
18 POXIA PROGRAM.—Section 603A of the Harmful Algal
19 Bloom and Hypoxia Research and Control Act of 1998
20 (33 U.S.C. 4002) is amended—

21 (1) in subsection (a)—

22 (A) in paragraph (1)—

23 (i) by striking “predicting,” and in-
24 serting “monitoring, observing, fore-
25 casting,”; and

1 (ii) by striking “and” after the semi-
2 colon;

3 (B) in paragraph (2)—

4 (i) by striking “comprehensive re-
5 search plan and action strategy under sec-
6 tion 603B” and inserting “Action Strat-
7 egy, including scientific assessment, under
8 section 603(c)”; and

9 (ii) by striking the period and insert-
10 ing “; and”; and

11 (C) by adding at the end the following new
12 paragraph:

13 “(3) the scientific assessment under section
14 603(b).”;

15 (2) in subsection (c)—

16 (A) in paragraph (3), by striking “ocean
17 and Great Lakes” and inserting “marine, estu-
18 arine, and freshwater systems”; and

19 (B) in paragraph (5), by inserting “while
20 recognizing each agency is acting under its own
21 independent mission and authority” before the
22 semicolon;

23 (3) in subsection (d), by striking “Except as
24 provided in subsection (h), the” and inserting
25 “The”;

1 (4) in subsection (e)—

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

4 “(2) examine, in collaboration with State and
5 local entities and Indian Tribes, including island
6 communities, low-population rural communities, In-
7 digenous communities, subsistence communities,
8 fisheries, and recreation industries that are most de-
9 pendent on coastal and water resources that may be
10 impacted by marine and freshwater harmful algal
11 blooms and hypoxia, the causes, ecological con-
12 sequences, cultural impacts, and social and economic
13 costs of harmful algal blooms and hypoxia;”;

14 (B) by striking paragraph (3);

15 (C) by redesignating paragraphs (4), (5),
16 and (6) as paragraphs (3), (4), and (5), respec-
17 tively;

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

19 (i) by striking “to, regional” and in-
20 sserting “to regional”; and

21 (ii) by striking “agencies” and insert-
22 ing “entities, and regional coastal observ-
23 ing systems (as such term is defined in
24 section 12330(6) of the Integrated Coastal

1 and Ocean Observation System Act of
2 2009 (33 U.S.C. 3602(6))”;

3 (E) in paragraph (5), as so redesignated,
4 by inserting “and communities” after “eco-
5 systems”;

6 (F) by inserting after paragraph (5) the
7 following new paragraph:

8 “(6) support sustained observations, including
9 through peer-reviewed, merit-based, competitive
10 grant funding, to provide State and local entities,
11 Indian Tribes, and others access to real-time or near
12 real-time observation data for decision-making to
13 protect human and ecological health and local econo-
14 mies;”;

15 (G) in paragraph (8), by striking “State
16 and local” and inserting “State, local, and Trib-
17 al”; and

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

20 (5) by amending subsections (f) and (g) to read
21 as follows:

22 “(f) COOPERATIVE EFFORTS.—The Under Secretary
23 shall work cooperatively with and avoid duplication of ef-
24 fort of other agencies on the Task Force, and with and
25 of States, Indian tribes, and nongovernmental organiza-

1 tions concerned with marine and freshwater issues, and
2 shall coordinate harmful algal bloom and hypoxia and re-
3 lated activities and research.

4 “(g) FRESHWATER AND ESTUARINE PROGRAM DU-
5 TIES.—

6 “(1) IN GENERAL.—The Administrator shall—

7 “(A) with respect to freshwater aspects of
8 the Program, in coordination with the Task
9 Force, carry out the duties under subsection (e)
10 through the activities required under section
11 603C; and

12 “(B) with respect to estuarine aspects of
13 the Program, coordinate with the Under Sec-
14 retary to carry out activities required under this
15 section.

16 “(2) NONDUPLICATION.—The Administrator
17 shall ensure that activities carried out under this
18 subsection focus on new approaches to addressing
19 freshwater harmful algal blooms and are not dupli-
20 cative of existing research and development pro-
21 grams authorized under this Act or any other law.”;
22 and

23 (6) by amending subsection (h) to read as fol-
24 lows:

1 “(h) ANTI-DEFICIENCY ACT APPLIED TO HARMFUL
2 ALGAL BLOOM SERVICES.—Any services by an officer or
3 employee under this title relating to the immediate devel-
4 opment and dissemination of the Harmful Algal Bloom
5 Operational Forecast System of the National Centers for
6 Coastal Ocean Science and the National Oceanic and At-
7 mospheric Administration shall be considered, for pur-
8 poses of section 1342 of title 31, United States Code, serv-
9 ices for emergencies involving the safety of human life or
10 the protection of property. Such consideration shall only
11 apply to areas with active harmful algal blooms during any
12 lapse in appropriations beginning on or after the date of
13 the enactment of this subsection.”.

14 (d) NATIONAL OCEANIC AND ATMOSPHERIC ADMIN-
15 ISTRATION ACTIVITIES.—

16 (1) IN GENERAL.—Section 603B of the Harm-
17 ful Algal Bloom and Hypoxia Research and Control
18 Act of 1998 (33 U.S.C. 4003) is amended to read
19 as follows:

20 **“SEC. 603B. NATIONAL OCEANIC AND ATMOSPHERIC AD-
21 MINISTRATION ACTIVITIES.**

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

23 “(1) carry out marine, coastal, and Great
24 Lakes harmful algal bloom and hypoxia events re-
25 sponse activities;

1 “(2) develop and enhance operational harmful
2 algal bloom observing and forecasting programs, in-
3 cluding operational observations and forecasting,
4 monitoring, modeling, data management, and infor-
5 mation dissemination;

6 “(3) maintain and enhance peer-reviewed,
7 merit-based, competitive grant funding relating to
8 harmful algal blooms and hypoxia to—

9 “(A) maintain and enhance baseline moni-
10 toring programs established by the Program;

11 “(B) support the projects maintained and
12 established by the Program;

13 “(C) address the research and manage-
14 ment needs and priorities identified in the Ac-
15 tion Strategy under section 603(c);

16 “(D) accelerate the utilization of effective
17 methods of intervention and mitigation to re-
18 duce the frequency, severity, and impacts of
19 harmful algal bloom and hypoxia events;

20 “(E) identify opportunities to improve
21 monitoring of harmful algal bloom and hypoxia,
22 with a particular focus on coastal waters that
23 may affect fisheries, public health, or subsist-
24 ence harvest;

1 “(F) examine the effects of other environ-
2 mental stressors on harmful algal blooms and
3 hypoxia;

4 “(G) assess the effects of multiple environ-
5 mental stressors on living marine resources and
6 coastal ecosystems; and

7 “(H) evaluate adaptation and mitigation
8 strategies to address the impacts of harmful
9 algal blooms and hypoxia;

10 “(4) enhance communication and coordination
11 among Federal agencies carrying out marine and
12 freshwater harmful algal bloom and hypoxia activi-
13 ties and research;

14 “(5) to the greatest extent practicable, leverage
15 existing resources and expertise available from local
16 research universities and institutions; and

17 “(6) use cost effective methods in carrying out
18 this section.

19 “(b) INTEGRATED COASTAL AND OCEAN OBSERVA-
20 TION SYSTEM.—The collection of monitoring and observ-
21 ing data under this section shall comply with all data
22 standards and protocols developed pursuant to the Inte-
23 grated Coastal and Ocean Observation System Act of
24 2009 (33 U.S.C. 3601 et seq.). Such data shall be made
25 available through the system established under that Act.”.

1 (2) CLERICAL AMENDMENT.—The table of con-
2 tents in section 2 of the Coast Guard Authorization
3 Act of 1998 (Public Law 105–383) is amended by
4 amending the item relating to section 603B to read
5 as follows:

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

6 (e) ENVIRONMENTAL PROTECTION AGENCY ACTIVI-
7 TIES.—

8 (1) IN GENERAL.—The Harmful Algal Bloom
9 and Hypoxia Research and Control Act of 1998 (33
10 U.S.C. 4001 et seq.) is amended by inserting after
11 section 603B of that Act (33 U.S.C. 4003), as
12 amended by subsection (d), the following new sec-
13 tion:

14 **“SEC. 603C. ENVIRONMENTAL PROTECTION AGENCY AC-**
15 **TIVITIES.**

16 “The Administrator shall—

17 “(1) carry out research on the ecology and
18 human health impacts of freshwater harmful algal
19 blooms;

20 “(2) develop and maintain forecasting and mon-
21 itoring of, and event response to, freshwater harmful
22 algal blooms in lakes, reservoirs, rivers, and estu-
23 aries (including tributaries thereof);

24 “(3) enhance communication and coordination
25 among Federal agencies carrying out freshwater

1 harmful algal bloom and hypoxia activities and re-
2 search;

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

6 “(5) use cost effective methods in carrying out
7 this section.”.

8 (2) CLERICAL AMENDMENT.—The table of con-
9 tents in section 2 of the Coast Guard Authorization
10 Act of 1998 (Public Law 105–383) is amended by
11 inserting after the item relating to section 603B, as
12 amended by subsection (e), the following new item:

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

13 (f) NATIONAL HARMFUL ALGAL BLOOM AND HY-
14 POXIA OBSERVING NETWORK.—

15 (1) IN GENERAL.—Section 606 of the Harmful
16 Algal Bloom and Hypoxia Research and Control Act
17 of 1998 (33 U.S.C. 4005) is amended to read as fol-
18 lows:

19 **“SEC. 606. NATIONAL HARMFUL ALGAL BLOOM OBSERVING**
20 **NETWORK.**

21 “(a) IN GENERAL.—The Under Secretary, acting
22 through the National Centers for Coastal Ocean Science
23 (referred to in this section as ‘NCCOS’) and the Inte-
24 grated Ocean Observing System (referred to in this section
25 as ‘IOOS’) of the National Oceanic and Atmospheric Ad-

1 ministration, shall integrate Federal, State, regional, and
2 local observing capabilities to establish a national network
3 of harmful algal bloom observing systems for the moni-
4 toring, detection, and forecasting of harmful algal blooms
5 by leveraging the capacity of IOOS regional associations,
6 including through the incorporation of emerging tech-
7 nologies and new data integration methods, such as artifi-
8 cial intelligence.

9 “(b) COORDINATION.— In carrying out subsection
10 (a), the IOOS Program Office shall—

11 “(1) coordinate with NCCOS regarding obser-
12 vations, data integration, and information dissemi-
13 nation; and

14 “(2) establish a Harmful Algal Bloom Data As-
15 sembly Center to integrate, disseminate, and provide
16 a central architecture to support ecological fore-
17 casting.”.

18 (2) CLERICAL AMENDMENT.—The table of con-
19 tents in section 2 of the Coast Guard Authorization
20 Act of 1998 (Public Law 105–383) is amended by
21 amending the item relating to section 606 to read as
22 follows:

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

23 (g) DEFINITIONS.—Section 609 of the Harmful Algal
24 Bloom and Hypoxia Research and Control Act of 1998
25 (33 U.S.C. 4008) is amended—

1 (1) in paragraph (1), by striking “means the
2 comprehensive research plan and action strategy es-
3 tablished under section 603B” and inserting “means
4 the action strategy, including scientific assessment,
5 for marine and freshwater harmful algal blooms es-
6 tablished under section 603(c)”;

7 (2) in paragraph (3), to read as follows:

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

10 “(A) in the case of marine systems or
11 Great Lakes hypoxia or harmful algal bloom
12 event, including those in estuarine areas, the
13 Under Secretary; and

14 “(B) in the case of a freshwater hypoxia or
15 harmful algal bloom event, the Administrator,
16 in consultation with the Under Secretary.”;

17 (3) by striking paragraph (9);

18 (4) by redesignating paragraphs (4), (5), (6),
19 (7), and (8) as paragraphs (6), (7), (8), (10), and
20 (11);

21 (5) by inserting after paragraph (3) the fol-
22 lowing new paragraphs:

23 “(4) HARMFUL ALGAL BLOOM; HARMFUL
24 ALGAL BLOOM AND HYPOXIA EVENT.—

1 “(A) HARMFUL ALGAL BLOOM.—The term
2 ‘harmful algal bloom’ means marine or fresh-
3 water algae or macroalgae, including
4 Sargassum, that proliferate to high concentra-
5 tions, resulting in nuisance conditions or harm-
6 ful impacts on marine and freshwater eco-
7 systems, communities, or human health through
8 the production of toxic compounds or other bio-
9 logical, chemical, or physical impacts of the
10 algae outbreak.

11 “(B) HARMFUL ALGAL BLOOM AND HY-
12 POXIA EVENT.—The term ‘harmful algal bloom
13 and hypoxia event’ means the occurrence of a
14 harmful algal bloom or hypoxia as a result of
15 a natural, anthropogenic, or undetermined
16 cause.

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

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

1 (A) by striking “aquatic” and inserting
2 “marine or freshwater”; and

3 (B) by striking “resident” and inserting
4 “marine or freshwater”; and

5 (7) by inserting after paragraph (8), as so re-
6 designated, the following new paragraph:

7 “(9) SUBSISTENCE USE.—The term ‘subsist-
8 ence use’ means the customary and traditional use
9 of fish, wildlife, or other freshwater, coastal, or ma-
10 rine resources by any individual or community to
11 meet personal or family needs, including essential
12 economic, nutritional, or cultural applications.”.

13 (h) AUTHORIZATION OF APPROPRIATIONS.—Section
14 610 of the Harmful Algal Bloom and Hypoxia Research
15 and Control Act of 1998 (33 U.S.C. 4009) is amended—

16 (1) in subsection (a), to read as follows:

17 “(a) IN GENERAL.—There is authorized to be appro-
18 priated to the Under Secretary to carry out this title
19 \$27,500,000 for each of fiscal years 2024 through 2028.”;
20 and

21 (2) by adding at the end the following new sub-
22 section:

23 “(c) TRANSFER AUTHORITY.—The Under Secretary
24 is authorized to make a direct non-expenditure transfer
25 of funds authorized to be appropriated pursuant to sub-

1 section (a) to the head of any Federal department or agen-
2 cy, with the concurrence of such head, to carry out, as
3 appropriate, relevant provisions of this title.”.

4 (i) NATIONAL LEVEL INCUBATOR PROGRAM; HARM-
5 FUL ALGAL BLOOM OR HYPOXIA EVENT OF SIGNIFI-
6 CANCE.—

7 (1) IN GENERAL.—The Harmful Algal Bloom
8 and Hypoxia Research and Control Act of 1998 (33
9 U.S.C. 4001 et seq.) is amended by adding at the
10 end the following new section:

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

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

21 “(b) OPERATION.—The incubator established under
22 subsection (a) shall provide merit-based funding for harm-
23 ful algal bloom control strategies and technologies that
24 eliminate or reduce through biological, chemical, or phys-

1 ical means the levels of harmful algae and associated tox-
2 ins.

3 “(c) DATABASE.—The incubator established under
4 subsection (a) shall include a database to catalog the li-
5 censing and permitting requirements, economic costs, fea-
6 sibility, effectiveness, and scalability of both novel and es-
7 tablished prevention, control, and mitigation measures.

8 “(d) PRIORITIZATION.—In carrying out the incubator
9 established under subsection (a), the Under Secretary
10 shall prioritize proposed activities that would, to the max-
11 imum extent practicable—

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

13 “(2) maintain biodiversity;

14 “(3) protect public health;

15 “(4) protect coastal resources of national, his-
16 torical, and cultural significance; or

17 “(5) seek to partially or fully benefit commu-
18 nities of color, low-income communities, Indian
19 Tribes or Indigenous communities, and rural com-
20 munities.”.

21 (2) CLERICAL AMENDMENT.—The table of con-
22 tents in section 2 of the Coast Guard Authorization
23 Act of 1998 (Public Law 105–383) is amended by
24 inserting after the item relating to section 610 the
25 following new item:

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

1 (j) HARMFUL ALGAL BLOOM OR HYPOXIA EVENT OF
2 SIGNIFICANCE.—Section 9(g) of the National Integrated
3 Drought Information System Reauthorization Act of 2018
4 (33 U.S.C. 4010(g)) is amended—

5 (1) in paragraph (1)—

6 (A) in subparagraph (B), by adding at the
7 end the following new sentence: “The appro-
8 priate Federal official may waive the non-Fed-
9 eral share requirements of this subsection if
10 such official determines no reasonable means
11 are available through which the recipient of the
12 Federal share can meet the non-Federal share
13 requirement.”; and

14 (B) by adding at the end the following new
15 subparagraph:

16 “(D) CONTRACT, GRANT, AND COOPERA-
17 TIVE AGREEMENT AUTHORITY.—The Under
18 Secretary of Commerce for Oceans and Atmos-
19 phere may enter into agreements and grants
20 with States, Indian Tribes, local governments,
21 or other entities to pay for or reimburse costs
22 incurred for the purposes of supporting the de-
23 termination of and assessing the environmental,
24 economic, social, subsistence use, and public

1 health effects of a harmful algal bloom or hy-
2 poxia event of significance.”;

3 (2) in paragraph (2)(A), by inserting “, leader-
4 ship official of an affected Indian Tribe, the execu-
5 tive official of the District of Columbia, or a terri-
6 tory or possession of the United States, including
7 Puerto Rico, the Virgin Islands, Guam, the Com-
8 monwealth of the Northern Mariana Islands, the
9 Trust Territories of the Pacific Islands, and Amer-
10 ican Samoa, if affected” after “State”; and

11 (3) by adding at the end the following new
12 paragraph:

13 “(4) FUNDING AUTHORITY.—To carry out this
14 subsection, notwithstanding any other provision of
15 law, there is authorized to be appropriated from the
16 amounts made available to the Under Secretary of
17 Commerce for Oceans and Atmosphere \$2,000,000,
18 to remain available until expended.”.

19 (k) PROTECT FAMILIES FROM TOXIC ALGAL
20 BLOOMS.—Section 128 of the Water Resources Develop-
21 ment Act of 2020 (33 U.S.C. 610 note) is amended—

22 (1) by redesignating subsection (e) as sub-
23 section (f); and

24 (2) by inserting after subsection (d) the fol-
25 lowing new subsection:

1 “(e) HARMFUL ALGAL BLOOM TECHNOLOGIES.—In
2 carrying out the demonstration program under subsection
3 (a), the Secretary may enter into agreements with water
4 and irrigation districts located in the focus areas described
5 in subsections (c) and (d) for the use or sale of any new
6 technologies developed under the program to expedite the
7 removal of harmful algal blooms in such areas.”.

8 **TITLE II—ENHANCING FEDERAL**
9 **WEATHER FORECASTING AND**
10 **INNOVATION**

11 **SEC. 201. WEATHER INNOVATION FOR THE NEXT GENERA-**
12 **TION.**

13 (a) IN GENERAL.—Not later than 180 days after the
14 date of the enactment of this Act, the Under Secretary
15 shall establish a Research, Development, Test, and Eval-
16 uation Program (in this section referred to as the “Pro-
17 gram”) to ensure the continued performance of weather
18 radar capabilities, including systems currently being devel-
19 oped, with interferences in the line of sight of such radar.

20 (b) REQUIREMENTS.—In carrying out the Program,
21 the Under Secretary, in consultation with the Interagency
22 Council for Advancing Meteorological Services, shall—

23 (1) partner with the private sector, academia,
24 Federal, State, and local government entities, and

1 any other entity the Under Secretary considers ap-
2 propriate;

3 (2) identify, evaluate, and test existing or near-
4 commercial technologies and solutions that improve
5 radar coverage and performance, including by miti-
6 gating the potential impact of interferences on
7 weather radar;

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

11 (A) signal processing algorithms;

12 (B) short-term forecasting algorithms to
13 replace contaminated data;

14 (C) the use of dual polarization character-
15 istics in mitigating the effects of wind turbines
16 on weather radar; and

17 (D) gap filling radars to provide supple-
18 mental or replacement observations in impacted
19 areas; and

20 (4) develop, support, or partner with developers
21 to provide commercially viable technical mitigation
22 solutions for interferences to weather radar capabili-
23 ties that are compatible with the operational require-
24 ments of the weather radar systems.

1 (c) PRIORITY.—In carrying out subsection (b), the
2 Under Secretary shall prioritize consideration of the fol-
3 lowing technology-based mitigation solutions:

4 (1) Phased array weather radar systems.

5 (2) Supplementing or replacing contaminated
6 data with commercial radar data.

7 (3) The utilization of data from private sector
8 associated meteorological towers or similar capabili-
9 ties.

10 (4) The display on local forecasting equipment
11 of wind farm boundaries and consolidated wind farm
12 areas.

13 (5) The installation and provision of access to
14 rain gauges.

15 (6) Any other technology-based mitigation solu-
16 tion the Under Secretary determines could improve
17 radar coverage by overcoming interferences, beam
18 blockage, or ghost echoes.

19 (d) REPORT; RECOMMENDATION.—

20 (1) IN GENERAL.—Not later than two years
21 after the date of the enactment of this section and
22 annually thereafter until the Program terminates
23 pursuant to subsection (e), the Under Secretary
24 shall submit to Congress a report on the implemen-
25 tation of the Program, including an evaluation of

1 each technology-based mitigation solution identified
2 for priority consideration pursuant to subsection (c),
3 and a recommendation regarding additional identi-
4 fication and testing of new technologies based on
5 such consideration.

6 (2) FINAL RECOMMENDATION.—Not later than
7 five years after the date of the enactment of this
8 section, the Under Secretary shall provide to Con-
9 gress a recommendation on whether additional re-
10 search, testing, and development through the Pro-
11 gram established under subsection (a) is needed, and
12 a determination of whether a cessation of field re-
13 search, testing, development and evaluation is appro-
14 priate.

15 (e) TERMINATION.—The authority of the Under Sec-
16 retary to carry out the Program shall terminate on the
17 earlier of—

18 (1) September 30, 2029; or

19 (2) one year after the date on which the final
20 recommendation required under subsection (d)(2) is
21 submitted by the Under Secretary.

22 (f) DEFINITIONS.—In this section:

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

1 (2) GHOST ECHO.—The term “ghost echo”
2 means radar signal reflectivity or velocity return er-
3 rors in radar data due to the proximity of an inter-
4 ference.

5 (3) INTERFERENCE.—The term “interference”
6 includes the following:

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

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

11 (C) any other natural or human built
12 structure that affects a weather radar system.

13 **SEC. 202. NEXT GENERATION RADAR.**

14 (a) IN GENERAL.—The Under Secretary shall de-
15 velop a plan to replace the Next Generation Weather
16 Radar of the National Weather Service (“NEXRAD”)
17 system in existence as of the date of the enactment of this
18 section.

19 (b) PROCUREMENT DEADLINE.—The Under Sec-
20 retary shall take such actions as may be necessary to en-
21 sure the replacement described in subsection (a) is com-
22 pleted by not later than September 30, 2040.

23 (c) ELEMENTS.—The plan developed pursuant to
24 subsection (a) shall include the following:

1 (1) Estimates of quantifiable improvements in
2 radar performance and service delivery, including
3 coverage and accuracy, to be made from replacement
4 of the NEXRAD system referred to in such sub-
5 section.

6 (2) Development of a digital phased array radar
7 test article designed to test and determine the speci-
8 fications and requirements for such replacement.

9 (3) Establishment of a weather surveillance
10 radar testbed for the following:

11 (A) Evaluation of commercial radars with
12 the potential to replace or supplement the
13 NEXRAD system.

14 (B) Providing technical assistance for com-
15 mercial replacement or supplemental radars, in-
16 cluding data void filling radars in regions where
17 geographical topography prevents full utilization
18 of conventional systems.

19 (4) Consultation and input solicited from mete-
20 orologists, emergency managers, and public safety
21 officials regarding the specifications and require-
22 ments for the replacement of the NEXRAD system
23 referred in such subsection.

1 (5) Prioritized locations for initial deployment
2 of the replacement system described in subsection
3 (a) that will replace the NEXRAD system.

4 (6) Expected locations of such replacement sys-
5 tem described in subsection (a), including sites lo-
6 cated more than 75 miles away from an existing
7 NEXRAD station and additional appropriate loca-
8 tions.

9 (d) RADAR-AS-A-SERVICE.—

10 (1) IN GENERAL.—In order to supplement data
11 voids in radar coverage in existence as of the date
12 of the enactment of this section and ensure the con-
13 tinued performance of weather radar capabilities,
14 the Under Secretary may utilize and contract with
15 third party entities to fill such low-level and wide-
16 area radar data voids using diverse weather radars
17 and data assimilation technologies to better detect
18 significant precipitation and severe weather over a
19 greater area across the population.

20 (2) CONSIDERATIONS.—In carrying out the ac-
21 tivities under paragraph (1), the Under Secretary
22 may consider—

23 (A) utilizing and contracting with third-
24 party entities that have participated in the
25 testbed established in accordance with sub-

1 section (c)(3), the National Mesonet Program,
2 or Cooperative Research and Development
3 Agreements; and

4 (B) weather camera systems and services,
5 including systems and services in consultation
6 with the Federal Aviation Administration, as
7 viable technologies to supplement weather fore-
8 casting and prediction needs.

9 (e) UPDATES TO CONGRESS.—The Under Secretary
10 shall provide to the Committee on Science, Space, and
11 Technology of the House of Representatives and the Com-
12 mittee on Commerce, Science, and Transportation of the
13 Senate periodic updates on the implementation of this sec-
14 tion.

15 **SEC. 203. DATA VOIDS IN HIGHLY VULNERABLE AREAS OF**
16 **THE UNITED STATES.**

17 (a) IN GENERAL.—The Under Secretary, in coordi-
18 nation with the Director of the National Weather Service
19 and the Administrator of the Federal Emergency Manage-
20 ment Agency, in consultation with the United States
21 weather industry, academic partners, and in accordance
22 with activities implemented through existing regional at-
23 mospheric, coastal, ocean, and Great Lakes observing sys-
24 tems, shall carry out activities to ensure equitable and
25 comprehensive weather observation coverage and emer-

1 gency information sharing in the United States, including
2 relating to the following:

3 (1) Reviewing areas in the continental United
4 States and the territories that are considered under-
5 observed, underserved, or highly vulnerable for
6 weather phenomenon, including urban and offshore
7 regions, and identifying associated challenges to pro-
8 viding such coverage.

9 (2) Increasing weather observations and devel-
10 oping new weather observational capabilities, such as
11 urban heat island mapping campaigns, with respect
12 to under-observed, underserved, or highly vulnerable
13 regions.

14 (3) Establishing or supporting testbeds to de-
15 velop and integrate new weather, water, and climate
16 observation or emergency information sharing tools,
17 such as next generational or supplemental radars for
18 weather observations, in under-observed, under-
19 served, or highly vulnerable regions.

20 (4) To the maximum extent practicable, ad-
21 vancing weather and water forecasting and climate
22 modeling capabilities for under-observed, under-
23 served, or highly vulnerable regions.

24 (5) Undertaking workforce development efforts
25 for emergency management officials and meteorolo-

1 gists in under-observed, underserved, or highly vul-
2 nerable areas, including urban regions, of the United
3 States.

4 (6) Using data void filling observations to bet-
5 ter resolve extreme rainfall in complex topography.

6 (7) Contributing to a national integrated heat
7 health information systems.

8 (b) PILOT PROGRAM.—In carrying out this section,
9 the Under Secretary, acting through the Director of the
10 National Weather Service and the Administrator of the
11 Federal Emergency Management Agency, shall establish
12 an interagency partnership to support pilot projects that
13 accelerate coordination and use of localized weather,
14 water, and climate data and impact-based communications
15 in infrastructure and emergency management decisions by
16 Federal, State, and local officials.

17 (c) PRIORITY.—At least one pilot project under sub-
18 section (b) shall address key science challenges to using
19 mesonet data in local decision making and development
20 of new tools and training for owners and operators of crit-
21 ical infrastructure (as such term is defined in section
22 1016(e) of Public Law 107–56 (42 U.S.C. 5195c(e))),
23 such as dams, energy generation and distribution facili-
24 ties, nuclear power plants, and transportation networks.

1 **SEC. 204. ATMOSPHERIC RIVERS FORECAST IMPROVEMENT**
2 **PROGRAM.**

3 (a) IN GENERAL.—The Under Secretary, in collabo-
4 ration with the United States weather industry and aca-
5 demic partners, shall establish an atmospheric river fore-
6 cast improvement program (in this section referred to as
7 the “program”).

8 (b) GOAL.—The goal of the program shall be to re-
9 duce through the development and extension of accurate,
10 effective, and actionable forecasts and warnings the loss
11 of life or property from atmospheric rivers, including by—

12 (1) establishing quantitative atmospheric river
13 forecast skill metrics that include quantifying the
14 benefits of dynamical modeling, data assimilation,
15 and machine learning improvements in the prob-
16 abilistic forecasts of landfall location, extreme wind
17 and precipitation, and cascading impacts;

18 (2) developing an atmospheric river forecast
19 system within the unified forecast system, and ad-
20 vancing next-generation coupled modeling systems,
21 with the capability of providing seasonal to short-
22 range atmospheric river forecasts that include fore-
23 cast of snow accumulation and other hydrologic com-
24 ponents;

25 (3) advancing scientific understanding of the
26 roles of atmospheric rivers in subseasonal to sea-

1 sonal precipitation and probabilistic predictions at
2 subseasonal and seasonal scales;

3 (4) developing tools and improved forecast
4 products to predict periods of active or inactive at-
5 mospheric river landfalls and inland penetration over
6 the western United States with a focus on address-
7 ing stakeholder and public needs related to per-
8 ceiving, comprehending, and responding to atmos-
9 pheric river forecast improvements; and

10 (5) enhancing research transition to operations
11 through the Administration’s testbeds, including the
12 evaluation of physical and social science, technology,
13 and other research to develop products and services
14 for implementation and use by relevant stakeholders.

15 (c) INNOVATIVE OBSERVATIONS AND MODELING.—

16 The Under Secretary shall ensure the program periodically
17 examines, tests, and evaluates the value of incorporating
18 innovative observations, such as novel sensor technologies,
19 observation networks, soil moisture monitoring systems,
20 reservoir storage data, observations from crewed or
21 uncrewed systems, and hosted instruments on commercial
22 aircrafts, vessels, and satellites, and data assimilation
23 tools, with respect to the improvement of atmospheric
24 river forecasts, predictions, and warnings.

1 (d) PROGRAM PLAN.—Not later than 180 days after
2 the date of the enactment of this Act, the Under Secretary
3 shall develop a plan that details the specific research, de-
4 velopment, data acquisition, and technology transfer ac-
5 tivities, as well as corresponding resources, limitations,
6 and timelines, necessary to achieve the goal of the pro-
7 gram under subsection (b).

8 (e) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After
9 the development of the plan pursuant to subsection (d),
10 the Under Secretary shall, not less frequently than annu-
11 ally, submit to Congress a proposed budget corresponding
12 with the activities identified in such plan.

13 **SEC. 205. COASTAL FLOODING AND STORM SURGE FORE-**
14 **CAST IMPROVEMENT PROGRAM.**

15 (a) IN GENERAL.—The Under Secretary, in collabo-
16 ration with the Integrated Ocean Observing System, the
17 United States weather industry, and academic partners,
18 shall establish a coastal flooding and storm surge forecast
19 improvement program (in this section referred to as the
20 “program”).

21 (b) GOAL.—The goal of the program shall be to re-
22 duce through the development and extension of accurate,
23 effective, actionable, and probable forecasts and warnings
24 the loss of life or property from coastal flooding, including
25 high tide flooding, and storm surge events.

1 (c) PRIORITY.—In implementing the program, the
2 Under Secretary shall prioritize activities that carry out
3 the following:

4 (1) Improving understanding and capacity for
5 real-time operational prediction of the ocean’s role in
6 coastal flooding, including high tide flooding, and
7 storm surge events.

8 (2) Improving the capacity to mitigate or pre-
9 vent the impacts of coastal flooding, including high
10 tide flooding, and storm surge events, including by
11 improving the understanding and capacity of coastal
12 communities to perceive, comprehend, and respond
13 to forecast information.

14 (3) Incorporating data from in situ distributed
15 sensors into models.

16 (4) Developing probabilistic coastal flooding, in-
17 cluding high tide flooding, and storm surge esti-
18 mates to complement worst-case scenario estimates,
19 including for use in long-term planning and risk
20 management by States, Tribal governments, local-
21 ities, and emergency managers in coordination with
22 the Federal Emergency Management Agency, as ap-
23 propriate.

24 (5) Establishing skill metrics for coastal inun-
25 dation forecasting that quantify the benefits of dy-

1 nautical modeling, data assimilation, and machine
2 learning improvements in the probabilistic forecast
3 of coastal flooding, including high tide flooding, and
4 storm surge risk and impacts.

5 (6) Improving operational regional storm surge
6 and wave prediction models to enhance probabilistic
7 guidance and messaging.

8 (d) INNOVATIVE OBSERVATIONS AND MODELING.—
9 The Under Secretary shall ensure the program periodically
10 examines, tests, and evaluates the value of incorporating
11 enhanced model physics, hybrid dynamical or machine
12 learning based prediction systems, and innovative observa-
13 tions, such as novel sensor technologies, observation net-
14 works, crewed or uncrewed systems, and hosted instru-
15 ments on commercial aircrafts, vessels, and satellites, with
16 respect to the improvement of coastal flooding, including
17 high tide flooding, and storm surge forecasts, predictions,
18 and warnings.

19 (e) PROGRAM PLAN.—Not later than 180 days after
20 the date of the enactment of this Act, the Under Secretary
21 shall develop a plan that details the specific research, de-
22 velopment, data acquisition, and technology transfer ac-
23 tivities, as well as corresponding resources and timelines,
24 necessary to achieve the goal of the program under sub-
25 section (b).

1 (f) ANNUAL BUDGET FOR PLAN SUBMITTAL.—After
2 the development of the plan pursuant to subsection (e),
3 the Under Secretary shall, not less frequently than annu-
4 ally, submit to Congress a proposed budget corresponding
5 with the activities identified in such plan.

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

7 (a) PROGRAM.—The Under Secretary shall maintain
8 an airborne observation program (in this section referred
9 to as the “program”) for the acquisition of atmospheric
10 sensor data and the deployment of critical atmospheric
11 sensors, including in partnership with the weather enter-
12 prise.

13 (b) ACTIVITIES.—The program shall include activi-
14 ties that carry out the following:

15 (1) Procurement of weather data available from
16 commercial aircraft, as determined by the Under
17 Secretary.

18 (2) Acquisition of additional vertical profile ob-
19 servations that provide spatial and temporal density,
20 as determined by the Under Secretary.

21 (3) Analysis of procured data when incor-
22 porated into the National Oceanic and Atmospheric
23 Administration’s unified forecast system in order to
24 provide improved forecast information for aircraft.

1 (c) BUDGET.—The Under Secretary shall, not less
2 frequently than annually, submit to Congress a proposed
3 budget corresponding with the activities described in sub-
4 section (b), including and analysis of activities that can
5 be complemented by National Oceanic and Atmospheric
6 Administration aircraft.

7 (d) AUTHORIZATION OF APPROPRIATIONS.—From
8 amounts made available to the Commercial Data Program
9 under section 302 of the Weather Research and Fore-
10 casting Innovation Act of 2017, there is authorized to be
11 appropriated up to \$10,000,000 for each of fiscal years
12 2024 through 2028 to carry out the program.

13 (e) AVIATION WEATHER AND TURBULENCE FORE-
14 CASTING.—The Director of the National Weather Service
15 shall include turbulence events, icing conditions, or other
16 phenomena in the forecasting capabilities of the National
17 Weather Service’s Aviation Weather Center, and deliver
18 operational forecasts with consistent, timely, and accurate
19 weather and turbulence information for the airspace sys-
20 tem and the protection of lives and property.

21 (f) COORDINATION.—In carrying out subsection (e),
22 the Director of the National Weather Service shall give
23 consideration to recommendations from the Administrator
24 of the Federal Aviation Administration in furtherance of

1 section 44720 of title 49, United States Code, and improve
2 weather and turbulence forecasting capabilities by—

3 (1) designating or establishing within the Fed-
4 eral Government an interagency working group to
5 determine weather and environmental data or obser-
6 vation requirements, needs, and potential solutions
7 related to aviation weather and turbulence modeling
8 or forecasting;

9 (2) identifying current and future potential
10 data gaps related to turbulence events or phenomena
11 that can—

12 (A) identify or inform route specific flight
13 planning; and

14 (B) be supplemented or filled by commer-
15 cial aviation tools;

16 (3) transitioning research initiatives and pilot
17 programs, including a pilot program of instrumenta-
18 tion for observing greenhouse gases and other at-
19 mospheric factors deployed on commercial aircraft
20 and supporting the evaluation of a sustained observ-
21 ing network using such platforms, into operations
22 that improve the forecasting missions of the Aviation
23 Weather Center;

1 (4) developing and deploying improved prob-
2 abilistic aviation weather forecast guidance tech-
3 nology; and

4 (5) updating interagency agreements as appro-
5 priate, including to address reimbursable agree-
6 ments.

7 (g) NEXT GENERATION AVIATION RESEARCH.—
8 Paragraph (3) of section 102(b) of the Weather Research
9 and Forecasting Innovation Act of 2017 (15 U.S.C.
10 8512(b)), is amended—

11 (1) by redesignating subparagraphs (F) and
12 (G) as subparagraphs (G) and (H), respectively; and

13 (2) by inserting after subparagraph (E) the fol-
14 lowing new subparagraph:

15 “(F) aviation weather phenomena, includ-
16 ing atmospheric composition and turbulence, to
17 improve scientific understanding and forecast
18 capabilities for the airspace system;”.

19 (h) AVIATION INFORMATION DISSEMINATION.—The
20 Under Secretary shall ensure the Aviation Weather Center
21 is able, to the maximum extent possible, to disseminate
22 in a timely manner full resolution aviation weather data,
23 forecasts, and information to meet the needs of aviation
24 users.

1 **SEC. 207. NESDIS JOINT VENTURE PARTNERSHIP TRANSI-**
2 **TION PROGRAM.**

3 (a) IN GENERAL.—The Assistant Administrator of
4 the National Environmental Satellite, Data, and Informa-
5 tion Service, in consultation with the Administrator of the
6 National Aeronautics and Space Administration, shall ad-
7 minister broad agency announcements and other trans-
8 actional authority or contracting mechanisms, on an an-
9 nual or more frequent basis, to support a joint venture
10 partnership program that allows the Service to prioritize
11 engagement with the private sector, academia, and other
12 Federal departments and agencies.

13 (b) TRANSITION PROGRAM.—To support the develop-
14 ment of next-generation technologies, missions, data sys-
15 tems, spacecraft, and instrument design, the Assistant Ad-
16 ministrator of the National Environmental Satellite, Data,
17 and Information Service, in consultation with the Admin-
18 istrator of the National Aeronautics and Space Adminis-
19 tration, shall maintain a program to transition selected
20 awards from research and study phases into demonstra-
21 tion. In selecting awardees for demonstrations, the Assist-
22 ant Administrator shall consider technologies, missions,
23 data systems, spacecraft, and instrument design that—

24 (1) improve upon the National Oceanic and At-
25 mospheric Administration’s satellite architecture;

1 (2) have a direct impact on implementing the
2 recommendations of the Administration’s 2018 Sat-
3 ellite Observing System Architecture Study, “Build-
4 ing a Plan for NOAA’s 21st Century Satellite Ob-
5 serving System”; and

6 (3) meet current or future mission require-
7 ments.

8 (c) OPERATIONAL PLANNING.—In carrying out the
9 transition program under subsection (b), the Assistant
10 Administrator of the National Environmental Satellite,
11 Data, and Information Service shall monitor demonstra-
12 tion phase progress and plan for promising results that
13 meet mission requirements to be transitioned into Na-
14 tional Oceanic and Atmospheric Administration’s oper-
15 ational satellite architecture.

16 (d) ANNUAL PLAN.—The Assistant Administrator of
17 the National Environmental Satellite, Data, and Informa-
18 tion Service shall submit to the Committee on Science,
19 Space, and Technology, and the Committee on Commerce,
20 Science, and Transportation an annual plan that outlines
21 the progress made in the joint venture partnership pro-
22 gram under subsection (a), the transition program for
23 demonstrations under section (b), and transition to oper-
24 ational architecture planning under subsection (c).

1 (e) AUTHORIZATION OF APPROPRIATIONS.—From
2 amounts authorized to be appropriated to the National
3 Environmental Satellite, Data, and Information Service,
4 there is authorized to be appropriated \$20,000,000 for fis-
5 cal years 2024 through 2028 to carry out to this section.

6 **SEC. 208. ADVANCED WEATHER INTERACTIVE PROCESSING**
7 **SYSTEM.**

8 (a) IN GENERAL.—The Under Secretary, acting
9 through the Director of the National Weather Service,
10 shall develop a strategy to transition operations of the Ad-
11 vanced Weather Interactive Processing System to an oper-
12 ational cloud-based environment in order to enable a more
13 nimble, flexible, and mobile workforce.

14 (b) SERVICES.—The Under Secretary shall ensure
15 that the Advanced Weather Interactive Processing System
16 in an operational cloud-based environment referred to in
17 subsection (a) provides impact-based decision support
18 services to emergency managers at the Federal, State,
19 local, and Tribal levels, and continues to provide the fol-
20 lowing services:

21 (1) Integrating and displaying forecast data, in-
22 cluding meteorological, hydrological, climate, ocean,
23 satellite, and radar data, for National Weather Serv-
24 ice field offices and national centers.

1 (2) Acquiring and processing observational data
2 from sensors and local sources.

3 (3) Providing an interactive communications
4 system, including the satellite broadcast network, to
5 connect relevant National Weather Service employ-
6 ees and sites.

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

11 (c) ELEMENTS.—The transition strategy developed
12 pursuant to subsection (a) may include the following:

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

16 (2) Coordinated training efforts needed for
17 Federal and non-Federal users and operators of the
18 Advanced Weather Interactive Processing System in
19 an operational cloud-based environment referred to
20 in subsection (a).

21 (3) Evaluation of bandwidth requirements to
22 achieve a quality user experience.

23 (4) Installation of circuits to reduce lapses in
24 network operations and support backup functions.

1 (5) Establishment of a cloud-based, remotely
2 accessible repository for data referred to in sub-
3 section (b)(2).

4 (6) Development and deployment of virtualized
5 systems to replace physical hardware at operational
6 sites.

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

9 (8) Development, testing, demonstration, eval-
10 uation, and operationalization of forecast and warn-
11 ing products, consistent with the mission and sci-
12 entific expertise of the Administration.

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

17 (e) **UPDATES TO CONGRESS.**—The Under Secretary
18 shall submit to the Committee on Science, Space, and
19 Technology of the House of Representatives and the Com-
20 mittee on Commerce, Science, and Transportation of the
21 Senate periodic updates on the implementation of this sec-
22 tion.

23 (f) **CONTINUED INNOVATION.**—Nothing in this sec-
24 tion may be construed as prohibiting the development of
25 new forecast capabilities, sub-systems, or implementing

1 modeling advancements on the operational computing sys-
2 tems of the Administration.

3 **SEC. 209. REANALYSIS AND REFORECASTING.**

4 The Under Secretary may support reanalysis and re-
5 forecasting activities within the National Oceanic and At-
6 mospheric Administration, including through the haz-
7 ardous weather testbed of the Administration, for improv-
8 ing weather forecasts, extreme weather predictions, and
9 weather and climate datasets.

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

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

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

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

1 (b) HEALTH AND MORALE ASSESSMENT.—The Di-
2 rector of the National Weather Service shall contract or
3 continue 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
7 rotating shift work. Such assessment may include options
8 for mitigating such impacts on employees and rec-
9 ommendations for improving benefits related to required
10 rotating 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
15 National Weather Service.

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

21 (3) PERFORMANCE BY OTHER EMPLOYEES.—

22 Notwithstanding paragraphs (4) and (5), the Direc-
23 tor of the National Weather Service may assign the
24 performance of the responsibilities described in this
25 subsection to such other staff of the National

1 Weather Service as the Director considers appro-
2 priate

3 (4) RESPONSIBILITIES.—In order to increase
4 impact-based decision support services, each service
5 coordination hydrologist designated under paragraph
6 (1) shall, with respect to hydrology, carry out the
7 following:

8 (A) Be responsible for providing service to
9 the geographic area of responsibility covered by
10 the Weather Forecast Office at which the serv-
11 ice coordination hydrologist is employed to help
12 ensure that users of products and services of
13 the National Weather Service can respond ef-
14 fectively 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
22 evaluate the adequacy and usefulness of the
23 products and services referred to in subpara-
24 graph (A), including extended range streamflow
25 forecasts, water supply forecasts, drought out-

1 looks, flood inundation mapping, coastal inun-
2 dation, and flood warnings.

3 (C) Collaborate with the National Water
4 Center, River Forecast Centers, other Weather
5 Forecast Offices, the National Integrate
6 Drought Information System, Administration
7 offices, and Federal, State, local, and Tribal
8 government agencies, as the Director considers
9 appropriate, in developing, proposing, and im-
10 plementing plans to develop, modify, or tailor
11 such products and services to improve the use-
12 fulness of such 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
21 partner call lists, appropriate office hydrologic
22 service policy or procedures, and other hydro-
23 logic information or dissemination methodolo-
24 gies or strategies.

1 (F) Work closely with Federal, State, local,
2 and Tribal emergency and floodplain manage-
3 ment agencies, and other agencies relating to
4 disaster management, to ensure a planned, co-
5 ordinated, and effective preparedness and re-
6 sponse 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 Serv-
13 ice 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
6 Act 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 of-
11 fices of the National Oceanic and Atmospheric Adminis-
12 tration, shall maintain a Commercial Data Program to co-
13 ordinate and execute acquisition of weather and environ-
14 mental data and services from private sector entities for
15 operational use.

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

24 “(1) The National Mesonet Program.

25 “(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
12 Secretary determines appropriate.

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

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

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

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
12 as the ‘Councils’) to provide strategic recommenda-
13 tions and guidance regarding the prioritization, de-
14 sign, development, acquisition, upgrading, lifecycle,
15 performance monitoring, and retiring of major ob-
16 serving systems portfolio components, including re-
17 lated to the acquisition of commercial weather and
18 environmental data and services.

19 “(2) LINE OFFICE COORDINATION.—The Coun-
20 cils shall ensure coordination and adherence to uni-
21 form policies by providing guidance to all line offices
22 of the National Oceanic and Atmospheric Adminis-
23 tration engaged in observing systems portfolio de-
24 sign, technology, development, execution, and oper-
25 ation.

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
7 National Oceanic and Atmospheric Administration
8 to 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 appro-
18 priated or otherwise made available in a fiscal year
19 to carry 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 environ-
24 mental data and services through contracts with
25 commercial data and service providers.

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

4 “(h) OMBUDSMAN.—The Under Secretary shall es-
5 tablish or designate at least one Ombudsman position
6 within the Commercial Data Program to implement the
7 recommendations of the Observing System Council under
8 subsection (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 envi-
16 ronmental data and services.

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

1 dissemination, and long-term preservation activities across
2 all National Oceanic and Atmospheric Administration line,
3 staff, and corporate offices.”.

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

5 The Weather Research and Forecasting Innovation
6 Act 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 mercial Data Program under section 302, there shall be
11 a Commercial Data Pilot Program to engage with external
12 partners and providers to test and develop shared stand-
13 ards and methodologies for quality, use, licensing, and at-
14 tribution of observation services and data, and to ensure
15 quality, impact, and compatibility of such services and
16 data with National Oceanic and Atmospheric Administra-
17 tion modeling capabilities, meteorological situational
18 awareness, and forecasting. The Program is authorized to
19 test and evaluate all sources and types of observation serv-
20 ices, imagery, products, and data from private sector enti-
21 ties, including new and innovative surface-based, airborne-
22 based, space-based, and coastal- and ocean-based data,
23 metadata, and model components.

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

1 Program 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
6 contracts with private sector entities capable of providing
7 observation services and data referred to in subsection (a)
8 that meet the standards and specifications published pur-
9 suant to section 302(c) for so providing such services and
10 data in a manner that allows the Under Secretary to cali-
11 brate and evaluate such services and data for use in Na-
12 tional 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
19 to which such contracts meet the standards and specifica-
20 tions published pursuant to section 302(c), and any addi-
21 tional information determined necessary related to the fol-
22 lowing:

23 “(1) The viability of assimilating observation
24 services and data from private sector entities into

1 National Oceanic and Atmospheric Administration
2 forecasts and models.

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

7 “(3) The accuracy, quality, timeliness, validity,
8 reliability, usability, information technology security,
9 and cost-effectiveness of obtaining observation serv-
10 ices and data from private sector entities.

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

15 “(e) OBTAINING FUTURE DATA.—If an assessment
16 under subsection (d) demonstrates the ability of commer-
17 cial services and data to meet the standards and specifica-
18 tions published pursuant to section 302(c), the Under Sec-
19 retary shall—

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

24 “(2) as early as possible in the acquisition proc-
25 ess for any future National Oceanic and Atmos-

1 pheric Administration satellite system, determine
2 whether there is a suitable, cost-effective, commer-
3 cial capability available or that will be available to
4 meet applicable instrument, spacecraft, or system re-
5 quirements before completion of the critical design
6 phase of such planned satellite system;

7 “(3) if a suitable, cost-effective, commercial ca-
8 pability is or will be available as described in para-
9 graph (2), determine whether and how such capa-
10 bility is in the national interest if developed as a
11 solely governmental system; and

12 “(4) submit to the Committee on Commerce,
13 Science, and Transportation of the Senate and the
14 Committee on Science, Space, and Technology of the
15 House of Representatives a report detailing any de-
16 terminations made under paragraphs (2) and (3).

17 “(f) AUTHORIZATION OF APPROPRIATIONS.—From
18 amounts authorized to be appropriated pursuant to sec-
19 tion 302 to carry out such section, not less than 15 per-
20 cent of such amounts each fiscal year are authorized to
21 be appropriated to carry out this section.”.

1 **SEC. 303. CONTRACTING AUTHORITY AND AVOIDANCE OF**
2 **DUPLICATION.**

3 Title III of the Weather Research and Forecasting
4 Innovation Act of 2017 is amended by adding at the end
5 the following new section:

6 **“SEC. 304. CONTRACTING AUTHORITY AND AVOIDANCE OF**
7 **DUPLICATION.**

8 “(a) IN GENERAL.—Consistent with other Federal
9 agencies that contract and partner with private sector en-
10 tities, the Under Secretary is authorized to use con-
11 tracting mechanisms and enter into agreements that uti-
12 lize multiyear contract options. In carrying out sections
13 302 and 303, the Under Secretary shall, to the greatest
14 extent possible—

15 “(1) enter into year-long or multiyear contract
16 options using contracting mechanisms that foster re-
17 siliency of datatypes purchased;

18 “(2) partner and contract with multiple obser-
19 vation service and data providers simultaneously to
20 reduce risks of data gaps and improve mission
21 robustness; and

22 “(3) utilize authorities, such as additional
23 forms of transaction agreements under section 301,
24 that allow for innovative partnerships with private
25 sector entities.

1 “(b) SAVINGS CLAUSE.—Nothing in this title may be
2 construed as infringing on the acquisition authority or
3 strategy of Federal entities authorized under title 10,
4 United States Code.

5 “(c) UNNECESSARY DUPLICATION.—In meeting the
6 requirements under this title, the Under Secretary shall
7 avoid unnecessary duplication between the National Oce-
8 anic and Atmospheric Administration, the National Aero-
9 nautics and Space Administration, other Federal depart-
10 ments and agencies, and private sector entities, including
11 relating to corresponding expenditures of funds and em-
12 ployment of personnel by—

13 “(1) coordinating existing activities with other
14 civilian Federal departments and agencies which
15 provide, contract, or partner with private sector enti-
16 ties to acquire, weather and environmental observa-
17 tions and data; and

18 “(2) coordinating and soliciting weather and en-
19 vironmental observations and data requirements and
20 needs from other civilian Federal departments and
21 agencies to be acquired by the Commercial Data
22 Program under section 302.

23 “(d) FAIR COMPENSATION FOR INTERAGENCY
24 NEEDS.—The Under Secretary, to the maximum extent
25 practicable, shall ensure that Federal departments and

1 agencies utilizing services and data under sections 302
2 and 303 fairly compensate the National Oceanic and At-
3 mospheric Administration, or the non-Federal entities pro-
4 viding such services or data, as appropriate, for use.”.

5 **SEC. 304. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**
6 **ING PRACTICES.**

7 Title III of the Weather Research and Forecasting
8 Innovation Act of 2017, as amended by section 303 of this
9 Act, is further amended by adding at the end the following
10 new section:

11 **“SEC. 305. DATA ASSIMILATION, MANAGEMENT, AND SHAR-**
12 **ING PRACTICES.**

13 “(a) DATA STANDARDS.—The Under Secretary, in
14 collaboration with the weather enterprise, shall seek to es-
15 tablish consistent and open data and metadata standards
16 to support open science, including simple cloud-optimized
17 data formats and application programming interfaces that
18 support findability, accessibility, usability, and
19 preservability.

20 “(b) DATA INFRASTRUCTURE.—

21 “(1) IN GENERAL.—The Under Secretary, in
22 consultation with the Chief Information Officer and
23 appropriate program heads, shall consolidate and ar-
24 range data infrastructure needs to ensure efficient
25 and effective data transfer between National Oceanic

1 and Atmospheric Administration offices by consid-
2 ering the use of commercial cloud technologies, or
3 similar hybrid structures, to host and transmit data
4 and metadata.

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

18 “(3) LONG TERM DATA ARCHIVE.—The Under
19 Secretary shall ensure the long-term management,
20 maintenance, and stewardship of archival data and
21 metadata acquired through the Commercial Data
22 Program under section 302 is conducted within the
23 National Centers for Environmental Information.

24 “(c) DATA SHARING WITH THE WEATHER ENTER-
25 PRISE.—To the greatest extent practicable, the Under

1 Secretary shall make accessible to members of the weather
2 enterprise that are United States persons data not subject
3 to redistribution contract permissions and purchased
4 through the Commercial Data Program under section 302
5 or shared through international government partners. If
6 purchased data must be assimilated into numerical weath-
7 er prediction models or automated forecast guidance to
8 satisfy redistribution contract permissions, the Under Sec-
9 retary shall make accessible without delay to members of
10 the weather enterprise that are United States persons the
11 numerical weather prediction model or automated forecast
12 guidance output, as the case may be.

13 “(d) DATA ASSIMILATION.—

14 “(1) IN GENERAL.—The Under Secretary, in
15 coordination with the Commercial Data Program
16 under section 302, the National Centers for Envi-
17 ronmental Information, and any other offices within
18 the Administration, shall establish a program to
19 test, advance, and implement data assimilation
20 methods, which may include artificial intelligence,
21 machine learning, data pre- and post-processing, ef-
22 ficient input and output, and next-generation algo-
23 rithms.

24 “(2) DATA ASSIMILATION UNIVERSITY CONSOR-
25 TIUM.—Through the program established pursuant

1 to paragraph (1), the Under Secretary shall estab-
2 lish a consortium consisting of institutions of higher
3 education (as such term is defined in section 101 of
4 the Higher Education Act of 1965 (20 U.S.C.
5 1001)) to address critical research challenges for
6 data assimilation and foster a growing data assimi-
7 lation workforce. The consortium shall seek to—

8 “(A) solve critical research issues for data
9 assimilation through innovative research;

10 “(B) increase significantly the number of
11 students, including graduate level and Ph.D.
12 candidates, in data assimilation;

13 “(C) utilize modern software and frame-
14 works, such as the Joint Effort for Data As-
15 similation Integration, to conduct data assimila-
16 tion research and development and facilitate re-
17 search to operations efforts;

18 “(D) identify and prioritize critical re-
19 search areas in data assimilation and facilitate
20 operations to research efforts;

21 “(E) establish and enable an effective col-
22 laboration infrastructure between National Oce-
23 anic and Atmospheric Administration facilities,
24 such as labs, centers, or joint agency institutes,
25 and the research community, including a mech-

1 anism for external partners to host Administra-
2 tion employees; and

3 “(F) establish mechanisms to enable all
4 members of the consortium to archive and ac-
5 cess data required to support the work under
6 this subsection.

7 “(3) COORDINATION.—In carrying out this sub-
8 section, the Under Secretary shall ensure the Na-
9 tional Oceanic and Atmospheric Administration and
10 its associated activities focus on research to oper-
11 ations and operations to research, including by co-
12 ordinating and collaborating with the Joint Center
13 for Satellite Data Assimilation.

14 “(4) DATA ASSIMILATION, MANAGEMENT, AND
15 SHARING PRACTICES SECURITY.—The activities au-
16 thorized under this subsection shall be applied in a
17 manner consistent with subtitle D of title VI of the
18 Research and Development, Competition, and Inno-
19 vation Act (enacted as division B of Public Law
20 117–167; 42 U.S.C. 19231 et seq.).

21 “(e) STUDY ON DATA MANAGEMENT.—

22 “(1) IN GENERAL.—Not later than 90 days
23 after the data of the enactment of this section, the
24 Under Secretary shall seek to enter into an agree-
25 ment with a non-Federal entity to conduct a study

1 on matters concerning data practices and manage-
2 ment needs at the National Oceanic and Atmos-
3 pheric Administration. In conducting the study, the
4 outside entity shall—

5 “(A) assess the costs and benefits of cur-
6 rent data management needs for observational
7 and operational mission requirements;

8 “(B) develop recommendations regarding
9 how to make more robust and cost-effective the
10 data portfolio of the Administration;

11 “(C) identify data infrastructure tech-
12 nologies and needs that are essential to the per-
13 formance of modeling systems of the Adminis-
14 tration;

15 “(D) assess the sharing needs and prac-
16 tices of the Administration for both internal
17 and external sharing dissemination; and

18 “(E) develop recommendations for methods
19 of data infrastructure sharing, including data
20 purchased from the commercial sector.

21 “(2) AUTHORIZATION OF APPROPRIATIONS.—

22 From amounts authorized to be appropriated to the
23 Commercial Data Program under section 302, there
24 are authorized to be appropriated to carry out the

1 study under paragraph (1) \$1,000,000, to remain
2 available until expended.”.

3 **SEC. 305. CLERICAL AMENDMENT.**

4 The table of contents in section 1(b) of the Weather
5 Research and Forecasting Innovation Act of 2017 is
6 amended by striking the items relating to sections 302 and
7 303 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.”.

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

10 **SEC. 401. DEFINITIONS.**

11 In this title:

12 (1) HAZARDOUS WEATHER OR WATER
13 EVENTS.—The term “hazardous weather or water
14 events” has the meaning given such term in section
15 406 of the Weather Research and Forecasting Inno-
16 vation Act of 2017 (Public Law 115–25; 131 Stat.
17 109), as amended by section 402 of this Act.

18 (2) INSTITUTION OF HIGHER EDUCATION.—The
19 term “institution of higher education” has the
20 meaning given such term in section 101 of the High-
21 er Education Act of 1965 (20 U.S.C. 1001).

22 (3) NOAA WEATHER RADIO.—The term
23 “NOAA Weather Radio” means the National Oce-

1 anic and Atmospheric Administration Weather Radio
2 All Hazards network.

3 (4) PUBLIC CLOUD.—The term “public cloud”
4 means an information technology model in which
5 service providers make computing services, including
6 compute and storage and develop-and-deploy envi-
7 ronments and applications, available on-demand to
8 organizations and individuals over the public inter-
9 net or other means that allows for the widest dis-
10 semination of information.

11 (5) WATCH; WARNING.—The terms “watch”
12 and “warning” have the meanings given such terms
13 in section 406 of the Weather Research and Fore-
14 casting Innovation Act of 2017 (Public Law 115–25;
15 131 Stat. 109), as amended by section 402 of this
16 Act.

17 **SEC. 402. HAZARDOUS WEATHER OR WATER EVENT RISK**
18 **COMMUNICATION.**

19 (a) IN GENERAL.—Section 406 of the Weather Re-
20 search and Forecasting Innovation Act of 2017 (Public
21 Law 115–25; 131 Stat. 109) is amended to read as fol-
22 lows:

23 **“SEC. 406. HAZARDOUS WEATHER OR WATER EVENT RISK**
24 **COMMUNICATION.**

25 “(a) DEFINITIONS.—In this section:

1 “(1) HAZARDOUS WEATHER OR WATER
2 EVENTS.—The term ‘hazardous weather or water
3 events’ means weather or water events that have a
4 high risk of loss of life or property, including the fol-
5 lowing:

6 “(A) Severe storms, such as hurricanes
7 and short-fused, small-scale hazardous weather
8 or hydrologic events produced by thunder-
9 storms, including large hail, damaging winds,
10 tornadoes, and flash floods.

11 “(B) Winter storms, such as freezing or
12 frozen precipitation (including freezing rain,
13 sleet, and snow), or combined effects of freezing
14 or frozen precipitation and strong winds.

15 “(C) Other weather hazards, such as ex-
16 treme heat or cold, wildfire, drought, dense fog,
17 high winds, and river, coastal, or lakeshore
18 flooding.

19 “(2) INSTITUTION OF HIGHER EDUCATION.—
20 The term ‘institution of higher education’ has the
21 meaning given such term in section 101 of the High-
22 er Education Act of 1965 (20 U.S.C. 1001).

23 “(3) WATCH; WARNING.—

24 “(A) IN GENERAL.—The terms ‘watch’ and
25 ‘warning’, with respect to a hazardous weather

1 or water event, mean products issued by the
2 National Oceanic and Atmospheric Administra-
3 tion, intended for consumption by the general
4 public, to alert the general public to the poten-
5 tial for or presence of such event and to inform
6 action to prevent loss of life or property.

7 “(B) EXCEPTION.—The terms ‘watch’ and
8 ‘warning’ do not include technical or specialized
9 meteorological or hydrological forecasts, out-
10 looks, or model guidance products.

11 “(b) SYSTEM COMMUNICATIONS.—The Under Sec-
12 retary shall maintain and improve the system of the Na-
13 tional Oceanic and Atmospheric Administration by which
14 the risks of hazardous weather or water events are com-
15 municated to the general public, with the goal of informing
16 response to prevent loss of life or property.

17 “(c) HAZARD RISK COMMUNICATION IMPROVEMENT
18 AND SIMPLIFICATION.—

19 “(1) IN GENERAL.—To carry out subsection
20 (b), the Under Secretary shall maintain a social, be-
21 havioral, risk, communication, and economic sciences
22 program (in this section referred to as the ‘Pro-
23 gram’), for the purpose of simplifying and improving
24 the communication of hazardous weather or water
25 events.

1 “(2) TERMINOLOGY.—The Program, in coordi-
2 nation with social, behavioral, risk, communication,
3 and economic science community and user feedback,
4 shall identify, eliminate, or modify unnecessary, re-
5 dundant, or confusing terms for communications re-
6 garding hazardous weather or water events and add
7 new terminology, as appropriate.

8 “(3) COMMUNICATIONS IMPROVEMENT.—The
9 Program shall improve the form, content, and meth-
10 ods of communications regarding hazardous weather
11 or water events and associated risks to more clearly
12 inform response to prevent the loss of life or prop-
13 erty.

14 “(4) EVALUATIONS.—The Program, in coordi-
15 nation with the performance and evaluation
16 branches of the National Weather Service and Oce-
17 anic and Atmospheric Research, shall develop
18 metrics for such branches to track and evaluate the
19 degree to which communications regarding haz-
20 ardous weather or water events inform response.

21 “(5) SUPPORT PLAN.—The Program shall de-
22 velop a plan for the purpose of carrying out para-
23 graph (3). Such plan shall be periodically updated
24 and informed by internal and extramural research
25 and the results of the evaluation of communications

1 regarding hazardous weather or water events and as-
2 sociated risks under paragraph (4).

3 “(6) METHODS.—In carrying out this section,
4 the Program shall develop and implement rec-
5 ommendations that—

6 “(A) are based on the best and most re-
7 cent understanding from social, behavioral, eco-
8 nomic, risk, and communications science re-
9 search;

10 “(B) are validated by social, behavioral,
11 risk, and communications science, taking into
12 account the importance of methods that support
13 reproduction and replication of scientific stud-
14 ies, use of rigorous statistical analyses, and, as
15 applicable, data analysis supported by artificial
16 intelligence and machine learning technologies;

17 “(C) account for the needs of various de-
18 mographics, vulnerable populations, and geo-
19 graphic regions;

20 “(D) account for the differences between
21 various types of hazardous weather or water
22 events;

23 “(E) respond to the needs of Federal,
24 State, and local government partners and media
25 partners; and

1 “(F) account for necessary changes in the
2 infrastructure, technology, and protocols for de-
3 veloping and disseminating watches and warn-
4 ings.

5 “(7) COORDINATION.—In carrying out this sec-
6 tion, the Program shall coordinate with the fol-
7 lowing:

8 “(A) Federal partners, including National
9 Laboratories, cooperative institutes, and re-
10 gional integrated sciences and assessments pro-
11 grams.

12 “(B) State and local government partners.

13 “(C) Tribal governments.

14 “(D) Institutions of higher education or a
15 consortia thereof.

16 “(E) Media partners.

17 “(8) TIMELINESS AND CONSISTENCY.—The
18 Program shall develop best practices and guidance
19 for ensuring timely and consistent communications
20 across public facing platforms that disseminate in-
21 formation related to hazardous weather or water
22 events.”.

23 (b) TABLE OF CONTENTS.—Section 1(b) of the
24 Weather Research and Forecasting Innovation Act of

1 2017 is amended by amending the item relating to section
2 406 to read as follows:

“Sec. 406. Hazardous Weather or Water Event Risk Communication.”.

3 **SEC. 403. HAZARD COMMUNICATION RESEARCH AND EN-**
4 **GAGEMENT.**

5 Section 406 of the Weather Research and Fore-
6 casting Innovation Act of 2017 (Public Law 115–25; 131
7 Stat. 109), as amended by section 402 of this Act, is fur-
8 ther amended by adding at the end the following new sub-
9 sections:

10 “(d) HAZARD COMMUNICATION RESEARCH AND EN-
11 GAGEMENT.—

12 “(1) IN GENERAL.—The Under Secretary shall
13 maintain, as appropriate, a program to—

14 “(A) modernize the development and com-
15 munication of risk-based, statistically reliable,
16 probabilistic hazard information, with the goal
17 of informing appropriate responses to haz-
18 ardous weather or water events; and

19 “(B) improve the fundamental social, be-
20 havioral, economic, risk, and communication
21 science relating to communications, including
22 by means of collecting voluntary data, regarding
23 hazardous weather or water events.

24 “(2) COORDINATION.—In carrying out the pro-
25 gram under paragraph (1), the Under Secretary

1 shall coordinate and communicate with States, Trib-
2 al governments, localities, and emergency managers
3 regarding research priorities and results.

4 “(3) PILOT PROGRAM FOR TORNADO HAZARD
5 COMMUNICATION REQUIRED.—To further research
6 into communications regarding hazardous weather
7 or water events, the Under Secretary, in coordina-
8 tion with the VORTEX program under section 103
9 and in collaboration with one or more eligible insti-
10 tutions (or a consortia thereof), shall establish a
11 pilot program for tornado hazard communication to
12 test the effectiveness of implementing research into
13 operations with respect to tornadoes.

14 “(4) PILOT STUDY FOR HURRICANE HAZARD
15 COMMUNICATION.—

16 “(A) IN GENERAL.—To further research
17 into communications regarding hazardous
18 weather or water events, the Under Secretary,
19 in coordination with the hurricane forecast im-
20 provement program under section 104, shall
21 seek to enter into an agreement with an appro-
22 priate entity, as determined by the Under Sec-
23 retary, to conduct a pilot study using a mixed
24 methods approach, such as surveys, focus
25 groups, and interviews, to gather information

1 from hurricane prone population areas regard-
2 ing the levels of preparedness of such areas for
3 hurricanes or in response to the National Ocea-
4 nic and Atmospheric Administration’s early
5 forecasts and warnings. Such study shall evalu-
6 ate the following:

7 “(i) Possession of disaster supplies.

8 “(ii) Evacuation decisions.

9 “(iii) Levels of trust of tropical cy-
10 clone information and hurricane path pre-
11 diction from various sources.

12 “(iv) Access to tropical cyclone and
13 hurricane warnings in such study partici-
14 pant’s first language.

15 “(v) Determination regarding such
16 study participant’s reasoning that may
17 hinder the ability of such a participant to
18 evacuate or willingness to evacuate.

19 “(B) ADDITIONAL CRITERIA.—The pilot
20 study described in subparagraph (A) shall de-
21 fine its methodology and be made publicly avail-
22 able on a website of the National Oceanic and
23 Atmospheric Administration.

1 “(5) ELIGIBLE INSTITUTION DEFINED.—In this
2 subsection, the term ‘eligible institution’ means any
3 of the following:

4 “(A) An institution of higher education,
5 nonprofit organization, or other institution lo-
6 cated in a jurisdiction eligible to participate in
7 the program under section 113 of the National
8 Science Foundation Authorization Act of 1988
9 (42 U.S.C. 1862g).

10 “(B) An institution of higher education,
11 nonprofit organization, or other institution lo-
12 cated in proximity to a Weather Forecast Office
13 of the National Weather Service.

14 “(e) HURRICANE SOCIAL, BEHAVIORAL, AND ECO-
15 NOMIC SCIENCES.—As part of the program carried out
16 under subsection (d), the Under Secretary shall carry out
17 research and development activities to improve how the
18 public receives, interprets, responds to, and values hurri-
19 cane forecasts and warnings. In conducting such activities,
20 the Under Secretary shall—

21 “(1) conduct a comprehensive review of what is
22 known about how the public receives, interprets, re-
23 sponds to, and makes decisions regarding hurricane
24 forecasts and warnings, including—

1 “(A) how the connections between weather
2 observations, downstream models, and processes
3 affect the decision tools or products derived
4 from such hurricane forecasts and warnings;

5 “(B) how such hurricane forecasts and
6 warnings generated by decision tools and prod-
7 ucts are used by emergency managers, govern-
8 ments, and other users to benefit the public and
9 stakeholder groups;

10 “(C) how past experiences with hurricanes
11 impacts decision making;

12 “(D) how the source of such hurricane
13 forecasts and warnings affects interpretation;

14 “(E) how tropical cyclone warnings and
15 watches are received and interpreted;

16 “(F) how understanding of and response
17 to such hurricane forecasts and warnings vary
18 across demographic groups, including the elder-
19 ly, people with disabilities, and other vulnerable
20 populations;

21 “(G) language barriers; and

22 “(H) how understanding and response to
23 such hurricane forecasts and warnings varies
24 across geographic areas, including rural, urban,
25 and suburban areas;

1 “(2) identify communication data gaps based on
2 the review conducted pursuant to paragraph (1);

3 “(3) carry out research, including data collec-
4 tion and baseline assessments, in coordination with
5 the hurricane forecast improvement program under
6 section 104 to evaluate and quantify the economic
7 value of extending lead times of tropical cyclone and
8 hurricane warnings and watches, including identi-
9 fying the most effected or vulnerable populations
10 and potential impacts to those populations;

11 “(4) as part of post-storm surveys and assess-
12 ments conducted under section 406 of the Weather
13 Act Reauthorization Act of 2023, conduct retrospec-
14 tive or ex ante assessments of previous hurricane
15 forecasts and warnings with improvements to better
16 understand the key components, including expected
17 actions or behavior changes, of the value of the fore-
18 casts and warnings provided;

19 “(5) conduct cost benefit analysis of forecasts
20 and warnings improvement alternatives developed
21 through the hurricane forecast improvement pro-
22 gram under section 104; and

23 “(6) conduct risk assessments for pre-, during,
24 and post-storm periods in regions and communities

1 with significant elderly populations, including retire-
2 ment communities.”.

3 **SEC. 404. NATIONAL WEATHER SERVICE COMMUNICATIONS**
4 **IMPROVEMENT.**

5 (a) **IMPROVEMENT OF NWS INSTANT MESSAGING**
6 **SERVICE.**—The Director of the National Weather Service
7 shall improve the instant messaging service used by per-
8 sonnel of the National Weather Service by implementing,
9 not later than October 1, 2027, a commercial off-the-shelf
10 communications solution that replaces the instant mes-
11 saging service commonly referred to as “NWSSChat”.

12 (b) **REQUIREMENTS.**—The communications solution
13 implemented under this section shall—

- 14 (1) be hosted on the public cloud; and
15 (2) satisfy requirements set forth by the Direc-
16 tor to ensure such solution—
17 (A) best accommodates future growth;
18 (B) performs successfully with increased
19 numbers of users;
20 (C) is easy to use for the majority of users;
21 and
22 (D) is similar to systems already in com-
23 mercial use.

24 (c) **FUNDING.**—From amounts made available for
25 Operations, Research, and Facilities, the Director of the

1 National Weather Service shall allocate up to \$3,000,000
2 for each of fiscal years 2024 through 2027 to carry out
3 this section.

4 **SEC. 405. NOAA WEATHER RADIO MODERNIZATION.**

5 (a) IN GENERAL.—The Under Secretary shall, to the
6 maximum extent practicable, expand coverage of the
7 NOAA Weather Radio and ensure its reliability. In car-
8 rying out this subsection, the Under Secretary shall—

9 (1) maintain support for existing systems serv-
10 ing areas not covered by or having poor quality cel-
11 lular service;

12 (2) ensure consistent maintenance and oper-
13 ations monitoring, with timely repairs to broadcast
14 transmitter site equipment and antennas;

15 (3) enhance the ability to amplify Non-Weather
16 Emergency Messages via NOAA Weather Radio as
17 necessary; and

18 (4) acquire additional transmitters as required
19 to expand coverage to rural and underserved com-
20 munities, units of the National Park System, and
21 National Recreation Areas.

22 (b) MODERNIZATION INITIATIVE.—To the maximum
23 extent practicable, the Under Secretary shall enhance
24 NOAA Weather Radio to ensure its capabilities and cov-

1 erage remain valuable to the public. In carrying out this
2 section, the Under Secretary shall—

3 (1) upgrade telecommunications infrastructure
4 of NOAA Weather Radio to accelerate the transition
5 of broadcasts to internet protocol-based communica-
6 tions over non-copper media;

7 (2) accelerate software upgrades to the Ad-
8 vanced Weather Interactive Processing System, or
9 the relevant system successors, to implement partial
10 county notifications and alerts;

11 (3) consult with relevant stakeholders, including
12 the private sector, to enhance accessibility and
13 usability of NOAA Weather Radio data and feeds;

14 (4) develop options, including satellite backup
15 capability and commercial provider partnerships, for
16 NOAA Weather Radio continuity in the event of
17 Weather Forecast Office outages;

18 (5) research and develop alternative options, in-
19 cluding microwave capabilities, to transmit NOAA
20 Weather Radio signals to transmitters that are re-
21 mote or do not have internet protocol capability; and

22 (6) transition critical applications to the Inte-
23 grated Dissemination Program, or the relevant pro-
24 gram successors.

1 (c) PRIORITY.—In carrying out subsection (b), the
2 Under Secretary shall prioritize practices, capabilities, and
3 technologies recommended in accordance with the assess-
4 ment under subsection (d) to maximize accessibility, par-
5 ticularly in remote and underserved areas of the United
6 States.

7 (d) ASSESSMENT FOR MANAGEMENT AND DISTRIBUTION.—Not later than one year after the date of the enact-
8 tion.—Not later than one year after the date of the enact-
9 ment of this Act, the Under Secretary shall complete an
10 assessment of access to NOAA Weather Radio. In con-
11 ducting such assessment, the Under Secretary shall take
12 into consideration and provide recommendations regarding
13 the following:

14 (1) The need for continuous, adequate, and
15 operational real-time broadcasts of the NOAA
16 Weather Radio in both urban and rural areas.

17 (2) Solicited inputs from relevant stakeholders
18 on the compatibility of NOAA Weather Radio data
19 for third party platforms that provide online serv-
20 ices, such as websites and mobile device applications,
21 or deliver NOAA Weather Radio access.

22 (3) Existing or new management systems that
23 promote consistent, efficient, and compatible access
24 to NOAA Weather Radio.

1 (4) The ability of NOAA to aggregate real time
2 broadcast feeds at one or more central locations.

3 (5) Effective interagency coordination.

4 (6) The potential effects of an electromagnetic
5 pulse or geomagnetic disturbance on NOAA Weather
6 Radio.

7 (7) Any other function the Under Secretary de-
8 termines necessary.

9 **SEC. 406. POST-STORM SURVEYS AND ASSESSMENTS.**

10 (a) IN GENERAL.—The Under Secretary shall con-
11 tinue to perform one or more post-storm surveys and as-
12 sessments following every hazardous weather or water
13 event determined by the Under Secretary to be of suffi-
14 cient societal importance to warrant a post-event survey
15 and assessment.

16 (b) COORDINATION.—The Under Secretary shall co-
17 ordinate with Federal, State, local and Tribal govern-
18 ments, private entities, and relevant institutions of higher
19 education (or a consortia thereof) when conducting post-
20 storm surveys and assessments under this section to opti-
21 mize data collection, sharing, integration, archiving, and
22 access, as appropriate for research needs.

23 (c) DATA AVAILABILITY.—The Under Secretary shall
24 make the appropriate data obtained from each post-storm
25 survey and assessment conducted under this section avail-

1 able to the public as soon as practicable after conducting
2 each such survey and assessment.

3 (d) IMPROVEMENT.—In carrying out this section, the
4 Under Secretary shall—

5 (1) examine the role of uncrewed aerial and ma-
6 rine systems in data collection during post-storm
7 surveys and assessments conducted under this sec-
8 tion;

9 (2) identify gaps in and update tactics and pro-
10 cedures to enhance the efficiency and reliability of
11 data obtained from post-storm surveys and assess-
12 ments;

13 (3) to the maximum extent practicable, increase
14 the number of post-storm community impact studies,
15 particularly among under-observed, underserved, or
16 highly vulnerable populations, including—

17 (A) surveying-individual responses;

18 (B) conducting review of the accuracy of
19 prior risk evaluations;

20 (C) evaluating the efficacy of prior mitiga-
21 tion activity; and

22 (D) gathering survivability statistics; and

23 (4) as appropriate, integrate community-based,
24 social, behavioral, risk, communication, and eco-
25 nomic sciences elements into existing post-storm sur-

1 veys and assessments, including relating to efficacy
2 of forecast and warning information, barriers to ac-
3 tion, and messaging challenges.

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

9 (f) EXEMPTION.—Subchapter I of chapter 35 of title
10 44, United States Code, shall not apply to the collection
11 of information during the conduct of a survey or assess-
12 ment authorized under subsection (a).

13 **SEC. 407. GOVERNMENT ACCOUNTABILITY OFFICE REPORT**
14 **ON ALERT DISSEMINATION FOR HAZARDOUS**
15 **WEATHER OR WATER EVENTS.**

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

1 notification via alerts and updates regarding hazardous
2 weather or water events.

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

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

11 (2) An identification of secondary and tertiary
12 fail-safes for the timely distribution to the public of
13 notifications via alerts and updates regarding haz-
14 ardous weather or water events.

15 (3) A process analysis to determine the source
16 and extent to which public notifications via alerts
17 and updates regarding hazardous weather or water
18 events have been delayed and an identification of
19 possible improvements or corrective measures to ad-
20 dress latency in the notification process.

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

24 (5) A description of actions being undertaken to
25 better identify critical steps in public notification via

1 alerts and updates for hazardous weather or water
2 events that may be vulnerable to disruption or fail-
3 ure in the event of communication, technologic, or
4 computational failure.

5 (6) The geographical differences in availability
6 and effectiveness of rural systems, including an esti-
7 mated number of rural areas affected by unreliable
8 or unavailable accurate systems and barriers to ob-
9 tain or upgrade such systems.

10 **SEC. 408. DATA COLLECTION MANAGEMENT AND PROTEC-**
11 **TION.**

12 (a) DATA COLLECTION.—The Under Secretary may
13 collect social, behavioral, and economic data, including
14 Federal communication and related public response to
15 hazardous weather or water events. Where appropriate,
16 the Under Secretary shall encourage use of secondary
17 data, purchase data, or partner with the private sector.

18 (b) DATA MANAGEMENT.—The Under Secretary
19 shall establish a central repository system for the National
20 Oceanic and Atmospheric Administration for social, be-
21 havioral, and economic data related to the communication
22 of and related public response to hazardous weather or
23 water events, including data developed or received pursu-
24 ant to this title.

1 (c) PROTECTION OF DATA.—The Under Secretary
2 shall ensure that all data collected and managed by the
3 Administration is done within with all legal, regulatory,
4 and contractual obligations and in accordance with chap-
5 ter 31 of title 44, United States Code, and the Federal
6 Evidence-Based Policymaking Act of 2018 (Public Law
7 115–435).

8 (d) DIGITAL WATERMARKING.—The Under Secretary
9 shall develop methods to reduce the likelihood of unauthor-
10 ized tampering with online public notifications of haz-
11 ardous weather or water events, such as developing digital
12 watermarks.

13 (e) POLICIES AND PROCEDURES.—The Under Sec-
14 retary shall establish policies and procedures for the collec-
15 tion, archiving, and stewardship of data on community re-
16 sponse, including the response of effected or vulnerable
17 populations, to hazardous weather or water events.

18 **TITLE V—IMPROVING WEATHER**
19 **INFORMATION FOR AGRICULTURE AND WATER MAN-**
20 **CULTURE AND WATER MAN-**
21 **AGEMENT**

22 **SEC. 501. WEATHER AND CLIMATE INFORMATION IN AGRICULTURE AND WATER MANAGEMENT.**
23

24 Section 1762 of the Food Security Act of 1985 (15
25 U.S.C. 8521) is amended—

1 (1) by amending subsection (h) to read as fol-
2 lows:

3 “(h) SUBSEASONAL TO SEASONAL FORECASTING
4 PILOT PROJECTS.—

5 “(1) ESTABLISHMENT.—The Under Secretary
6 shall establish not fewer than two pilot projects, in
7 accordance with paragraph (2), within the U.S.
8 Weather Research Program of the Oceanic and At-
9 mospheric Research office of the National Oceanic
10 and Atmospheric Administration to support im-
11 proved subseasonal to seasonal precipitation fore-
12 casts for the following:

13 “(A) Water management in the western
14 United States.

15 “(B) Agriculture in the central United
16 States.

17 “(2) OBJECTIVES.—In carrying out this sub-
18 section, the Under Secretary shall ensure the fol-
19 lowing:

20 “(A) A pilot project under subparagraph
21 (A) of paragraph (1) addresses key science
22 challenges to improving forecasts and devel-
23 oping related products for water management
24 in the western United States, including the fol-
25 lowing:

1 “(i) Improving operational model reso-
2 lution, both horizontal and vertical, to re-
3 solve issues associated with mountainous
4 terrain, such as intensity of precipitation
5 and relative fraction of rain versus snow
6 precipitation.

7 “(ii) Improving fidelity in the oper-
8 ational modeling of the atmospheric bound-
9 ary layer in mountainous regions.

10 “(iii) Resolving challenges in pre-
11 dicting winter atmospheric circulation and
12 storm tracks, including periods of blocked
13 versus unblocked flow over the eastern
14 North Pacific Ocean and western United
15 States.

16 “(iv) Utilizing outcomes from the At-
17 mospheric Rivers Forecast Improvement
18 Program as authorized in section 204 of
19 the Weather Act Reauthorization Act of
20 2023 to produce operational tools and
21 services.

22 “(v) Improving the quality and tem-
23 poral and spatial resolution of observations
24 and accurate operational modeling of air-
25 sea interactions, and the influence of

1 oceans on subseasonal and seasonal fore-
2 casting.

3 “(B) A pilot project under subparagraph
4 (B) of paragraph (1) addresses key science
5 challenges to improving forecasts and devel-
6 oping related products for agriculture in the
7 central United States, including the following:

8 “(i) Improving the quality and tem-
9 poral and spatial resolution of observations
10 and accurate operational modeling of the
11 land surface and hydrologic cycle, includ-
12 ing soil moisture and flash drought proc-
13 esses.

14 “(ii) Improving fidelity in the oper-
15 ational modeling of warm season precipita-
16 tion processes.

17 “(iii) Understanding and predicting
18 large-scale upper-level dynamical flow
19 anomalies that occur in spring and sum-
20 mer.

21 “(3) ACTIVITIES.—A pilot project under this
22 subsection shall include activities that carry out the
23 following:

24 “(A) Best implement recommendations of
25 the National Weather Service’s 2020 Report,

1 entitled ‘Subseasonal and Seasonal Forecasting
2 Innovation: Plans for the Twenty-First Cen-
3 tury’.

4 “(B) Achieve measurable objectives for
5 operational forecast improvement.

6 “(C) Engage with, and leverage the re-
7 sources of, institutions of higher education (as
8 such term is defined in section 101 of the High-
9 er Education Act of 1965 (20 U.S.C. 1001)), or
10 a consortia thereof, and entities within the Na-
11 tional Oceanic and Atmospheric Administration
12 in existence as of the date of the enactment of
13 this subsection, including Regional Climate
14 Centers and the National Centers for Environ-
15 mental Information.

16 “(D) Are carried out in coordination with
17 the Assistant Administrator for the Office of
18 Oceanic and Atmospheric Research and the Di-
19 rector of the National Weather Service.

20 “(4) SUNSET.—The authority under this sub-
21 section shall terminate on the date that is five years
22 after the date of the enactment of this subsection.”;
23 and

24 (2) by amending subsection (j) to read as fol-
25 lows:

1 “(j) AUTHORIZATION OF APPROPRIATIONS.—There
2 are authorized to be appropriated \$45,000,000 for each
3 of fiscal years 2024 through 2028 to carry out the activi-
4 ties under this section.”.

5 **SEC. 502. NATIONAL INTEGRATED DROUGHT INFORMATION**
6 **SYSTEM.**

7 (a) IN GENERAL.—Section 3 of the National Inte-
8 grated Drought Information System Act of 2006 (15
9 U.S.C. 313d) is amended—

10 (1) in subsection (b)—

11 (A) in paragraph (1)—

12 (i) in subparagraph (A), by striking
13 “and” after the semicolon;

14 (ii) in subparagraph (B), by inserting
15 “and” after the semicolon; and

16 (iii) by adding at the end the fol-
17 lowing new subparagraph:

18 “(C) incorporates flash drought research
19 and tools to enhance timely response;”;

20 (B) in paragraph (5), by striking “and”
21 after the semicolon;

22 (C) in paragraph (6)—

23 (i) by inserting “(including ecological
24 drought)” after “drought” each place it
25 appears; and

1 (ii) by striking the period and insert-
2 ing a semicolon; and

3 (D) by adding at the end the following new
4 paragraphs:

5 “(7) advance and deploy next generation tech-
6 nologies related to drought and related publicly
7 available data, such as monitoring, preparedness,
8 and forecasting capabilities utilizing artificial intel-
9 ligence, machine learning, and cloud technologies;
10 and

11 “(8) utilize observational networks, including
12 the National Weather Service cooperative observer
13 program and State or regional hydrological moni-
14 toring projects, and refine drought indicators across
15 a variety of spatial and temporal scales for decision-
16 support products by optimizing data and resources
17 from across the Federal Government, including
18 snowpack, soil moisture, groundwater, and rapid in-
19 tensification data.”;

20 (2) in subsection (c)—

21 (A) in paragraph (2), by striking “and”
22 after the semicolon;

23 (B) in paragraph (3), by striking the pe-
24 riod and inserting “; and”; and

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

3 “(4) in partnership with the National Mesonet
4 Program, establish memoranda of understanding to
5 provide coordinated, high-quality, nationwide
6 drought information for the public good, including
7 integrated soil moisture information in accordance
8 with the 2021 report, ‘A Strategy for the National
9 Coordinated Soil Moisture Monitoring Network.’”;
10 and

11 (3) by amending subsection (f) to read as fol-
12 lows:

13 “(f) MODELING UPDATE.—The Under Secretary, in
14 partnership with National Integrated Drought Informa-
15 tion System and the Climate Prediction Center of the Na-
16 tional Weather Service, shall undertake an effort to transi-
17 tion existing drought products to probabilistic forecasts
18 and incorporate new and improved dynamical and statis-
19 tical forecast modeling tools.”.

20 (b) AUTHORIZATION OF APPROPRIATIONS.—Section
21 4 of the National Integrated Drought Information System
22 Act of 2006 (15 U.S.C. 313d note) is amended to read
23 as follows:

1 **“SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

2 “From amounts made available to Operations, Re-
3 search, and Facilities of the National Oceanic and Atmos-
4 pheric Administration, there are authorized to be appro-
5 priated to carry out this section the following:

6 “(1) \$15,000,000 for fiscal year 2024.

7 “(2) \$15,500,000 for fiscal year 2025.

8 “(3) \$16,000,000 for fiscal year 2026.

9 “(4) \$16,500,000 for fiscal year 2027.

10 “(5) \$17,000,000 for fiscal year 2028.”.

11 **SEC. 503. NATIONAL MESONET PROGRAM.**

12 (a) PROGRAM.—The Under Secretary shall maintain
13 the National Mesonet Program (in this section referred
14 to as the “Program”). The Program shall—

15 (1) obtain observations in all geographic envi-
16 ronments to improve understanding of and forecast
17 capabilities for atmospheric and water events, with
18 a prioritization on leveraging available commercial,
19 academic, and other non-Federal environmental data
20 to enhance coordination across the private, public,
21 and academic sectors of the United States weather
22 enterprise; and

23 (2) establish memoranda of understanding with
24 networks outside of the scope of the Program.

25 (b) PROGRAM ELEMENTS.—The Program shall carry
26 out the following activities:

1 (1) Improve environmental observations used by
2 the National Oceanic and Atmospheric Administra-
3 tion and the National Weather Service to support
4 baseline forecasts, including nowcasts, and warnings
5 that protect the Nation’s citizens, businesses, mili-
6 tary, and government agencies, and enable such in-
7 dividuals and entities to operate in safe, efficient,
8 and orderly manners.

9 (2) When demonstrably cost effective and meet-
10 ing or exceeding agency data quality standards, le-
11 verage existing networks of environmental moni-
12 toring stations, including supplemental radar sys-
13 tems, to increase the quantity and density of envi-
14 ronmental observations and data available to the Ad-
15 ministration.

16 (3) Establish means to integrate greater density
17 and type of environmental observations into the Pro-
18 gram on an annual basis, including by encouraging
19 local and regional networks of environmental moni-
20 toring stations, in situ sensor networks and satellite
21 constellations to participate in the Program.

22 (4) Yield increased quantities of boundary-layer
23 data to improve numerical weather prediction per-
24 formance, including regarding subseasonal to sea-
25 sonal timescales.

1 (5) Provide the critical technical and adminis-
2 trative infrastructure needed to facilitate rapid inte-
3 gration and sustained use of new and emerging net-
4 works of environmental monitoring stations antici-
5 pated in coming years from non-Federal sources.

6 (6) Expand and enhance environmental obser-
7 vational networks in the roadway environment to
8 provide real-time road weather and surface condi-
9 tions for surface transportation and related eco-
10 nomic sectors.

11 (7) Identify available terrestrial or marine envi-
12 ronmental data, or quantifiable gaps in such data, to
13 improve the understanding of air-sea interactions.

14 (8) Support the National Weather Service in
15 reaching its target of a 30-minute warning time for
16 severe weather through better predictive model algo-
17 rithms driven by increasingly effective observations.

18 (9) Coordinate with existing Administration
19 data used for forecasts, including data from the Na-
20 tional Environmental Satellite, Data, and Informa-
21 tion Service, the Integrated Ocean Observing Sys-
22 tem, the Global Ocean Monitoring and Observing
23 Program, the National Data Buoy Center, and the
24 National Ocean Service.

1 (10) Identify and communicate to the Office of
2 Oceanic and Atmospheric Research and other part-
3 ners priorities of research and development needed
4 to advance observations in the Program.

5 (11) Support the National Coordinated Soil
6 Moisture Monitoring Network in acquiring soil mois-
7 ture and related data to support the development of
8 decision-support products and other information
9 services.

10 (c) FINANCIAL AND TECHNICAL ASSISTANCE.—

11 (1) IN GENERAL.—In furtherance of the Pro-
12 gram, the Under Secretary may, to the extent
13 amounts are made available, award up to 15 percent
14 of the Program’s annual appropriations for financial
15 assistance to State, Tribal, private, and academic
16 entities seeking to build, expand, or upgrade equip-
17 ment and capacity of mesonet systems. Financial as-
18 sistance under this subsection may be made in co-
19 ordination with and in addition to awards from
20 other Federal agencies.

21 (2) AGREEMENTS.—Before receiving financial
22 assistance under paragraph (1), the State, Tribal,
23 private, or academic entity seeking financial assist-
24 ance under this subsection shall enter into an agree-
25 ment with the Under Secretary to provide data to

1 the Program, subject to verification by the Program
2 of the relative operational value and evaluation of
3 the cost of such data, for use in weather prediction,
4 severe weather warnings, and emergency response.

5 (3) ASSISTANCE AND OTHER SUPPORT.—The
6 Under Secretary may provide technical assistance,
7 project implementation support, and guidance to
8 State, Tribal, private, and academic entities seeking
9 financial assistance under this subsection. The
10 Under Secretary may provide technical and financial
11 assistance for maintenance of monitoring stations in
12 underrepresented or remote areas of the country
13 where it is financially unfeasible for one entity to op-
14 erate such stations without such assistance.

15 (4) TERMS.—In providing financial assistance
16 under this subsection, the Under Secretary shall es-
17 tablish terms to ensure that each State, Tribal, pri-
18 vate, or academic entity that receives financial as-
19 sistance under this subsection receives a level of
20 Federal support commensurate with the quality and
21 other characteristics of the data to be provided.

22 (5) DETERMINATION.—A State, Tribal, private,
23 or academic entity may receive financial assistance
24 under this subsection only if the Under Secretary
25 determines such entity shall provide sufficient non-

1 Federal financial support and full maintenance to
2 maintain the quality of the mesonet system and as-
3 sociated data standards required by the Program for
4 a period of not less than five years.

5 (6) PRIORITY.—The Under Secretary shall
6 prioritize providing assistance under paragraph (1)
7 to at least one entity in an underrepresented or re-
8 mote area.

9 (d) ADVISORY COMMITTEE.—

10 (1) IN GENERAL.—The Under Secretary shall
11 ensure the Program has an active advisory com-
12 mittee of subject matter experts to make rec-
13 ommendations to the National Oceanic and Atmos-
14 pheric Administration on the identification, imple-
15 mentation, procurement, and tracking of data need-
16 ed to supplement the Program, and recommend im-
17 provements, expansions, and acquisitions of available
18 data. The Under Secretary may designate an exist-
19 ing Federal advisory committee, subcommittee, or
20 working group, including, if appropriate, the Science
21 Advisory Board of the National Oceanic and Atmos-
22 pheric Administration, to carry out this subsection.

23 (2) ACADEMIC EXPERTISE.—The advisory com-
24 mittee under paragraph (1), in consultation with the
25 Program, shall include expertise from one or more

1 institutions of higher education (as such term is de-
2 fined in section 101 of the Higher Education Act of
3 1965 (20 U.S.C. 1001)) to assist the advisory com-
4 mittee to identify, evaluate, and recommend poten-
5 tial partnerships, regional or subregional consortia,
6 and collaborative methods that would expand the
7 number of participants and volume of data in the
8 Program.

9 (e) REGULAR REPORTING.—The Under Secretary
10 shall provide regular briefings, not less than twice annu-
11 ally, to the Committee on Science, Space, and Technology
12 of the House of Representatives and the Committee on
13 Commerce, Science, and Transportation of the Senate on
14 all Program activities. Such briefings shall include infor-
15 mation relating to the following:

16 (1) Efforts to implement the activities described
17 in subsection (b).

18 (2) Any financial or technical assistance pro-
19 vided pursuant to subsection (c).

20 (3) Efforts to address recommendations re-
21 ceived from the advisory committee under subsection
22 (d).

23 (4) The potential need and associated benefits
24 of a coastal and ocean mesonet, or other emerging
25 areas of weather data needs.

1 (5) Progress toward eliminating gaps in weath-
2 er observation data by States and regions of the
3 United States.

4 (6) Any other topic the Under Secretary deter-
5 mines relevant.

6 (f) **AUTHORIZATION OF APPROPRIATIONS.**—From
7 amounts made available to the National Weather Service,
8 the Under Secretary, to carry out this section, shall allo-
9 cate up to the following amounts for each specified fiscal
10 year:

11 (1) \$50,000,000 for fiscal year 2024.

12 (2) \$55,000,000 for fiscal year 2025.

13 (3) \$61,000,000 for fiscal year 2026.

14 (4) \$68,000,000 for fiscal year 2027.

15 (5) \$70,000,000 for fiscal year 2028.

16 **SEC. 504. NATIONAL COORDINATED SOIL MOISTURE MONI-**
17 **TORING NETWORK.**

18 (a) **IN GENERAL.**—The Under Secretary, in collabo-
19 ration with the Secretary of Agriculture, the Director of
20 the United States Geological Survey, the Administrator of
21 the National Aeronautics and Space Administration, and
22 the heads of other relevant Federal agencies and depart-
23 ments, shall support the development, deployment, and
24 maintenance of soil moisture monitoring networks by man-
25 aging the National Coordinated Soil Moisture Monitoring

1 Network (in this section referred to as the “Network”)
2 within the National Integrated Drought Information Sys-
3 tem.

4 (b) ACTIVITIES.—The Under Secretary shall ensure
5 the Network includes activities that carry out the fol-
6 lowing:

7 (1) Establishing a visible, user-friendly website.

8 (2) Developing a set of criteria for high-quality
9 data sources.

10 (3) Supporting research necessary to develop or
11 improve soil moisture monitoring products at a na-
12 tional scale.

13 (4) Increasing the number of long-term, high-
14 quality, in situ and remote sensing soil moisture
15 monitoring stations across the United States.

16 (5) Sharing methodologies and validation proto-
17 cols with the private sector.

18 (6) Engaging with the citizen science commu-
19 nity.

20 (7) Developing, releasing, and promoting new,
21 nationwide point-based and gridded soil moisture
22 data products that meet the needs of diverse end-
23 user groups.

24 (8) Supporting community building and out-
25 reach to the network of individuals engaged with soil

1 moisture information delivery, from data provision to
2 end-user decision making.

3 **SEC. 505. NATIONAL WATER CENTER.**

4 Section 301 of the Coordinated Ocean Observations
5 and Research Act of 2020 (42 U.S.C. 10371) is amend-
6 ed—

7 (1) in subsection (a)—

8 (A) in paragraph (1)(A)—

9 (i) in the matter preceding clause (i),
10 by inserting “as a component of the Na-
11 tional Centers for Environmental Pre-
12 diction” after “center”;

13 (ii) in clause (i), by striking “and”
14 after the semicolon;

15 (iii) in clause (ii), by striking the pe-
16 riod and inserting “; and”; and

17 (iv) by adding at the end the following
18 new clause:

19 “(iii) to provide service backup capa-
20 bilities and additional mission support
21 services for River Forecast Centers.”; and

22 (B) in paragraph (2), by adding at the end
23 the following new subparagraph:

24 “(F) Serving as the primary Center for
25 collaboration and coordination of the National

1 Oceanic and Atmospheric Administration’s
2 water research and operational activities with
3 existing Federal centers and networks, includ-
4 ing the Department of Agriculture, the Army
5 Corps of Engineers, the Bureau of Reclamation,
6 the United States Geological Survey, and the
7 Federal Emergency Management Agency.”;

8 (2) by striking subsection (b) and redesignating
9 subsections (c) through (e) as subsections (b)
10 through (d) respectively; and

11 (3) by amending subsection (c), as so redesign-
12 nated, to read as follows:

13 “(c) AUTHORIZATION OF APPROPRIATIONS.—There
14 is authorized to be appropriated \$46,000,000 for each of
15 fiscal years 2024 through 2028 to carry out this section.”.

16 **SEC. 506. SATELLITE TRANSFERS REPORT.**

17 Not later than 180 days after the date of the enact-
18 ment of this Act, the Secretary of Commerce shall submit
19 to the Committee on Commerce, Science, and Transpor-
20 tation of the Senate and the Committee on Science, Space,
21 and Technology of the House of Representatives a report
22 describing the Department of Commerce’s authorities,
23 policies, and Federal Government-wide policies related to
24 transferring any portion of the weather satellite systems
25 operated by the Department of Commerce to any other

1 Federal department or agency. The report shall also in-
2 clude the following:

3 (1) A description of the process for decommis-
4 sioning a Department of Commerce operational
5 weather satellite, any existing agreements related to
6 transfers of weather satellites, whether decommis-
7 sioned or not, and any reimbursable agreements re-
8 lated to the transfer of physical property or the op-
9 eration of Department of Commerce weather sat-
10 ellites on behalf of any other Federal department or
11 agency.

12 (2) A summary of any Department of Com-
13 merce plans for potential transfer of existing or fu-
14 ture weather satellite systems to any other Federal
15 department or agency.

16 **SEC. 507. PRECIPITATION FORECAST IMPROVEMENT PRO-**
17 **GRAM.**

18 (a) IN GENERAL.—Title VI of the Weather Research
19 and Forecasting Innovation Act of 2017 (15 U.S.C. 8501
20 et seq.) is amended—

21 (1) by redesignating section 603 as section 604;

22 and

23 (2) by inserting after section 602 the following
24 new section:

1 **“SEC. 603. PRECIPITATION FORECAST IMPROVEMENT PRO-**
2 **GRAM.**

3 “(a) IN GENERAL.—The Under Secretary, in collabo-
4 ration with the United States weather industry, other Fed-
5 eral agencies, and academic partners, shall maintain a
6 program to improve precipitation forecasting across
7 timescales.

8 “(b) GOAL.—The goal of the program under sub-
9 section (a) shall be to provide more accurate, reliable, and
10 timely precipitation forecasts across timescales through
11 the development and application of a fully coupled Earth
12 system prediction model in order to reduce the loss of life
13 or property related to precipitation extremes, with a focus
14 on the following:

15 “(1) Improving the understanding and pre-
16 diction of precipitation extremes from a variety of
17 weather systems, including atmospheric rivers.

18 “(2) Evaluating and incorporating, as appro-
19 priate, innovative observations into operational moni-
20 toring and forecast systems to improve precipitation
21 forecasts.

22 “(3) Improving earth system model predictions
23 of precipitation extremes from atmospheric rivers,
24 tropical cyclones, summer-time thunderstorms, win-
25 ter storms, and other phenomena, in coordination
26 with relevant programs.

1 “(4) Enhancing research transition to oper-
2 ations through testbeds, including the evaluation of
3 physical and social science, technology, and other re-
4 search to develop products and services for imple-
5 mentation and use by relevant stakeholders.

6 “(5) Incorporating social, behavioral, and eco-
7 nomic sciences best practices into operations for
8 more effective and actionable watch and warning
9 products that help drive public safety and damage
10 mitigation decisions in coordination with the pro-
11 grams established in accordance with this Act.

12 “(6) Ensuring data and metadata management
13 processes are in place to support data access and ar-
14 chive for long term research and operations among
15 multiple partners.

16 “(c) ACTIVITIES.—In carrying out the program
17 under subsection (a), the Under Secretary shall support
18 research-to-operations work, including relating to the fol-
19 lowing:

20 “(1) Implementing key strategies and following
21 priorities and objectives outlined by the National
22 Oceanic and Atmospheric Administration’s ‘Precipi-
23 tation Prediction Grand Challenge Strategy’.

1 “(2) Improving the physical science, operational
2 modeling and tools, and technology related to better
3 forecasting precipitation extremes across timescales.

4 “(3) Improving the social, behavioral, risk, com-
5 munications, 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 extreme precipitation.

9 “(4) Conducting the research necessary to de-
10 velop and deploy probabilistic weather forecast guid-
11 ance technology relating to precipitation extremes in
12 operational practice.

13 “(5) Enhancing the operational capacity of the
14 National Weather Service to deliver decision support
15 for increasing precipitation extremes.

16 “(6) Expanding computational resources to im-
17 prove precipitation modeling.

18 “(d) ANNUAL BUDGET.—The Under Secretary shall,
19 not less frequently than annually, submit to Congress a
20 proposed budget corresponding with carrying out this sec-
21 tion.”.

22 (b) CLERICAL AMENDMENT.—The table of contents
23 in section 1(b) of the Weather Research and Forecasting
24 Innovation Act of 2017 is amended by striking the item

1 relating to section 603 and inserting the following new
2 items:

“Sec. 603. Precipitation forecast improvement program.

“Sec. 604. Definitions.”.

Passed the House of Representatives April 30, 2024.

Attest:

KEVIN F. MCCUMBER,

Clerk.