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119TH CONGRESS
1ST SESSION

H. R. 3816

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.

IN THE HOUSE OF REPRESENTATIVES

JUNE 6, 2025

Mr. LUCAS (for himself, Ms. LOFGREN, Mr. SCOTT FRANKLIN of Florida, Ms. BONAMICI, Mr. WEBER of Texas, Ms. STEVENS, Mr. MILLER of Ohio, Ms. ROSS, Mrs. BICE, Ms. LEE of Pennsylvania, Mr. FLEISCHMANN, Mr. FROST, Ms. TENNEY, Mr. FEENSTRA, Mr. CRAWFORD, and Mr. FLOOD) introduced the following bill; which was referred to the Committee on Science, Space, and Technology, and in addition to the Committees on Natural Resources, Energy and Commerce, and Foreign Affairs, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

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A BILL

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

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the ''Weather Research and Forecasting Innovation Reauthorization Act of 2025'' or the ''Weather Act Reauthorization Act of 2025''.

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

TITLE IX—OTHER AUTHORITIES

SEC. 2. DEFINITIONS.

(a) IN GENERAL.—In this Act, the terms ''seasonal'', ''State'', ''subseasonal'', ''Under Secretary'', ''weather enterprise'', ''weather data'', and ''weather industry'' have the meanings given such terms in section 2 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501).

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

(1) by redesignating paragraph (5) as paragraph (6); and

(2) by inserting after paragraph (4) the following new paragraph:

''(5) WEATHER DATA.—The term 'weather data' means information used to track and predict weather conditions and patterns, including forecasts, observations, and derivative products from such information.''.

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

SEC. 101. PUBLIC SAFETY PRIORITY.

Section 101 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8511) is amended to read as follows:

"SEC. 101. PUBLIC SAFETY PRIORITY.

''(a) IN GENERAL.—The Under Secretary shall—

''(1) ensure the National Oceanic and Atmospheric Administration focuses on providing accurate and timely weather forecasts that protect lives and property and enhance the national economy;

''(2) through the Director of the National Weather Service, coordinate and implement observational infrastructure, weather forecasting, communications, and impact-based decision support services; and

''(3) work to improve operation weather forecasts, products, and services through nimble, flexible, and mobile methods.

''(b) RESEARCH.—In conducting research, the Under Secretary shall prioritize improving weather data, modeling, computing, forecasting, and warnings for the protec-

tion of life and property and for the enhancement of the national economy.''.

SEC. 102. UNITED STATES WEATHER RESEARCH AND FORECASTING.

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

''SEC. 110. AUTHORIZATION OF APPROPRIATIONS.

''(a) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Office of Oceanic and Atmospheric Research to carry out this title the following:

''(1) $163,794,000 for fiscal year 2026, of which—

''(A) $91,058,000 is authorized for weather laboratories and cooperative institutes;

''(B) $39,491,000 is authorized for the United States Weather Research Program;

''(C) $21,125,000 is authorized for tornado, severe storm, and next generation radar research; and

''(D) $12,120,000 is authorized for the joint technology transfer initiative described in section 102(b)(4) of this title.

"(2) $165,432,000 for fiscal year 2027, of which—

"(A) $91,968,000 is authorized for weather laboratories and cooperative institutes;

"(B) $39,886,000 is authorized for the United States Weather Research Program;

"(C) $21,336,000 is authorized for tornado, severe storm, and next generation radar research; and

"(D) $12,241,000 is authorized for the joint technology transfer initiative described in section 102(b)(4) of this title.

"(3) $167,086,000 for fiscal year 2028, of which—

"(A) $92,888,000 is authorized for weather laboratories and cooperative institutes;

"(B) $40,285,000 is authorized for the United States Weather Research Program;

"(C) $21,550,000 is authorized for tornado, severe storm, and next generation radar research; and

"(D) $12,364,000 is authorized for the joint technology transfer initiative described in section 102(b)(4) of this title.

"(4) $168,757,000 for fiscal year 2029, of which—

"(A) $93,817,000 is authorized for weather laboratories and cooperative institutes;

"(B) $40,688,000 is authorized for the United States Weather Research Program;

"(C) $21,765,000 is authorized for tornado, severe storm, and next generation radar research; and

"(D) $12,487,000 is authorized for the joint technology transfer initiative described in section 102(b)(4) of this title.

"(5) $170,444,000 for fiscal year 2030, of which—

"(A) $94,755,000 is authorized for weather laboratories and cooperative institutes;

"(B) $41,094,000 is authorized for the United States Weather Research Program;

"(C) $21,983,000 is authorized for tornado, severe storm, and next generation radar research; and

"(D) $12,612,000 is authorized for the joint technology transfer initiative described in section 102(b)(4) of this title.

''(b) LIMITATION.—No additional funds are authorized to carry out this title or the amendments made by this title.''.

SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN TORNADOES EXPERIMENT–UNITED STATES OF AMERICA (VORTEX–USA).

(a) IN GENERAL.—Section 103 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8513) is amended to read as follows:

''SEC. 103. VERIFICATION OF THE ORIGINS OF ROTATION IN TORNADOES EXPERIMENT–UNITED STATES OF AMERICA (VORTEX–USA).

''(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and academic partners, shall maintain a program for rapidly improving tornado forecasts, predictions, and warnings, including forecaster training in radar interpretation and information integration from new sources.

''(b) GOAL.—The goal of the program under subsection (a) shall be to develop and extend accurate tornado forecasts, predictions, and warnings in order to reduce the loss of life or property related to tornadoes, with a focus on the following:

''(1) Improving the effectiveness and timeliness of tornado forecasts, predictions, and warnings.

''(2) Optimizing lead time and providing actionable information beyond one hour in advance.

''(3) Transitioning from warn-on-detection to warn-on-forecast.

''(c) INNOVATIVE OBSERVATIONS.—The Under Secretary shall ensure the program under subsection (a) periodically examines, tests, and evaluates the value of incorporating innovative observations, such as novel sensor technologies, observation tools or networks, crewed or uncrewed systems, and hosted instruments on commercial aircrafts, vessels, and satellites, with respect to the improvement of tornado forecasts, predictions, and warnings.

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

''(1) Implementing key goals and achieving program milestones to the maximum extent practicable as outlined by the National Oceanic and Atmospheric Administration's 2019 report, 'Tornado Warning Improvement and Extension Program Plan'.

''(2) In coordination with the National Science and Technology Council's Social and Behavioral Sciences Subcommittee, improving the social, behavioral, risk, communication, and economic sciences regarding vulnerabilities, risk communication, and de-

livery of information critical for reducing the loss of life or property related to tornadoes.

''(3) Improving the physical sciences, computer modeling, and tools related to tornado formation, the impacts of tornadoes on the built and natural environment, and the interaction of tornadoes and hurricanes.

''(e) PRIORITY INSTITUTIONS.—

''(1) IN GENERAL.—In awarding grants under subsection (d), the Under Secretary may prioritize awarding grants to minority-serving institutions.

''(2) DEFINITION OF MINORITY-SERVING INSTITUTION.—In this subsection, the term 'minority-serving institution' means—

''(A) a part B institution (as defined in section 322 of the Higher Education Act of 1965 (20 U.S.C. 1061));

''(B) a Hispanic-serving institution (as defined in section 502(a) of such Act (20 U.S.C. 1101a(a)));

''(C) a Tribal College or University (as defined in section 316(b) of such Act (20 U.S.C. 1059c(b)));

"(D) an Alaska Native-serving institution (as defined in section 317(b) of such Act (20 U.S.C. 1059d(b)));

"(E) a Native Hawaiian-serving institution (as defined in section 317(b) of such Act (20 U.S.C. 1059d(b)));

"(F) a Predominantly Black Institution (as defined in section 318(b) of such Act (20 U.S.C. 1059e(b)));

"(G) an Asian American and Native American Pacific Islander-serving institution (as defined in section 320(b) of such Act (20 U.S.C. 1059g(b))); or

"(H) a Native American-serving, nontribal institution (as defined in section 319(b) of such Act (20 U.S.C. 1059f(b))).

"(f) WARNINGS.—In carrying out subsection (a), the Under Secretary, in coordination with the program established under section 403(a) of the Weather Act Reauthorization Act of 2025, shall—

"(1) conduct and transition to operations the research necessary to develop and deploy probabilistic weather forecast guidance technology for tornadoes and related weather phenomena;

''(2) incorporate into tornado modeling and forecasting, as appropriate, social, behavioral, risk, communication, and economic sciences;

''(3) enhance workforce training on radar interpretation and use of tornado warning systems; and

''(4) expand computational resources, including cloud computing, to support higher-resolution modeling to advance the capability for warn-on-forecast.

''(g) TORNADO RATING SYSTEM.—The Under Secretary, in collaboration with local communities and emergency managers, shall—

''(1) evaluate the system used as of the date of the enactment of this section to rate the severity of tornadoes;

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

''(3) if determined necessary, update such system.

''(h) ANNUAL BUDGET.—The Under Secretary shall, not less frequently than annually, submit to Congress a proposed budget corresponding with carrying out this section.

''(i) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Under Secretary to

carry out this section $11,000,000 for each of fiscal years 2026 through 2030, of which not less than $2,000,000 each fiscal year shall be used for prioritized grants awarded under subsection (e).''.

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

''Sec. 103. Verification of the Origins of Rotation in Tornadoes Experiment–United States of America (VORTEX–USA).''.

SEC. 104. HURRICANE FORECAST IMPROVEMENT PROGRAM.

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

''SEC. 104. HURRICANE FORECAST IMPROVEMENT PROGRAM.

''(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and academic partners, shall maintain a program to improve hurricane forecasting, predictions, and warnings.

''(b) GOAL.—The goal of the program under subsection (a) shall be to develop and extend accurate hurricane forecasts, predictions, and warnings in order to reduce the loss of life or property related to hurricanes, with a focus on the following:

''(1) Improving the understanding, prediction, and communication of rapid intensity change and projected path of hurricanes, including probabilistic methods for hurricane hazard mapping.

''(2) Improving the forecast and impact-based communication of inland flooding, compound flooding, and storm surges from hurricanes, in coordination with the program established under section 205 of the Weather Act Reauthorization Act of 2025.

''(3) Incorporating social, behavioral, risk, communication, and economic sciences to clearly inform response to prevent the loss of life or property.

''(4) Evaluating and incorporating, as appropriate, innovative observations, including acoustic or infrasonic measurements, novel sensor technologies, observation tools or networks, crewed or uncrewed systems, and hosted instruments on commercial aircrafts, vessels, and satellites.

''(c) ACTIVITIES.—In carrying out subsection (a), the Under Secretary shall award grants for research, including relating to the following:

''(1) Implementing key strategies and following priorities and objectives outlined by the National Oceanic and Atmospheric Administration's 2019 report 'Hurricane Forecast Improvement Program'.

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

''(3) Improving the physical sciences, operational modeling, and tools related to hurricane formation, the impacts of wind and water-based hurricane hazards on the built and natural environment, and the interaction of hurricanes and tornadoes.

''(d) WARNINGS.—In carrying out subsection (a), the Under Secretary, in coordination with the program established under section 403(a) of the Weather Act Reauthorization Act of 2025, shall—

''(1) conduct and transition to operations the research necessary to develop and deploy probabilistic weather forecast guidance technology relating to hurricanes and related weather phenomena;

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

''(3) expand computational resources, including cloud computing, to support and improve higher-resolution operational modeling of hurricanes and related weather phenomena.

''(e) ANNUAL REPORT.—Not later than June 1 of each year until 2030, the Under Secretary, in consultation with the Secretary of Defense, shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that includes the following:

''(1) The number and causes of missed mission requirements for the National Hurricane Operations Plan and the National Winter Season Operations Plan, including those related to equipment malfunction, aircraft availability, aircraft maintenance, flight hour limits, and availability of pilots or other air and maintenance crew members.

''(2) Requirements related to the plans described in paragraph (1) that were requested by forecasters but not tasked, and the reasons why those were not tasked.

''(3) A workforce management plan addressing any shortfalls in human capital resources that are

necessary for hurricane observational data collection aboard aircraft or uncrewed systems.

''(4) A summary of the following:

''(A) Hurricane technology that is under research and development to improve confidence in hurricane track and intensity predictions.

''(B) Hurricane technology that is at the prototype demonstration stage or beyond.

''(C) Plans for transitioning the hurricane technology described in subparagraph (B) into operations.''.

SEC. 105. TSUNAMI WARNING AND EDUCATION ACT REAUTHORIZATION.

(a) TITLE HEADING.—The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109–479) is amended—

(1) in title VIII, in the title heading (relating to the Tsunami Warning and Education Act; 33 U.S.C. 3201 et seq.), by inserting ''**, RESEARCH,**'' after ''**WARNING**''; and

(2) in the table of contents in section 1(b), by amending the item relating to the title heading for title VIII to read as follows:

''TITLE VIII—TSUNAMI WARNING, RESEARCH, AND EDUCATION.''.

(b) SHORT TITLE.—Section 801 of the Tsunami Warning and Education Act (enacted as title VIII of the

Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109–479; 33 U.S.C. 3201 note)) is amended by inserting ", Research," after "Warning".

(c) PURPOSES.—Section 803 of the Tsunami Warning, Research, and Education Act (enacted as title VIII of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109–479; 33 U.S.C. 3202)) is amended—

(1) in paragraph (2), by inserting "timeliness and" before "accuracy";

(2) in paragraph (7), by striking "and" after the semicolon;

(3) in paragraph (8), by striking the period and inserting "; and"; and

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

"(9) to ensure data and metadata are managed, archived, and made available for operations, research, education, and mitigation activities in accordance with section 305 of the Weather Research and Forecasting Innovation Act of 2017.".

(d) TSUNAMI FORECASTING AND WARNING PROGRAM.—Section 804 of the Tsunami Warning, Research, and Education Act (33 U.S.C. 3203) is amended—

(1) in subsection (b)—

(A) in paragraph (4), by inserting ", using industry and scientific best practices," after "operational condition";

(B) in paragraph (5)—

(i) in subparagraph (C), by striking "global seismic network" and inserting "Global Seismic Network";

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

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

"(D) the global navigation satellite system (GNSS) network;";

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

"(6) ensure data quality and management systems, support data and metadata access and archiving, and support the requirements of the program pursuant to the Foundations for Evidence-Based Policymaking Act of 2018 (Public Law 115–435) and chapter 31 of title 44, United States Code;";

(D) in paragraph (7)—

(i) by amending the matter preceding subparagraph (A) to read as follows: ''include a cooperative effort among the Administration, the United States Geological Survey (USGS), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF) under which the Director of USGS, the Director of the NSF, and the Administrator of NASA shall—'';

(ii) in subparagraph (A), by striking ''and'' at the end; and

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

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

''(D) assess the data and information relating to warning systems of collaborating agencies for potential utilization in NOAA's warning system, taking into consideration advancement in research and technology;

''(E) incorporate, as practicable, tsunami notifications and warnings in the USGS Earthquake Early Warning System; and

''(F) incorporate, as practicable, preliminary analysis or data from the National Earthquake Information Center regarding the source and magnitude of an offshore earthquake within five minutes of detection;'';

(E) in paragraph (8)—

(i) by inserting ''and decision support aides'' after ''graphical warning products,''; and

(ii) by inserting ''-prone'' after ''tsunami'';

(F) in paragraph (9), by striking ''and'' after the semicolon;

(G) in paragraph (10), by striking the period and inserting ''; and''; and

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

''(11) update tsunami inundation maps, models, or other geographic products, in order to best support, as appropriate, relevant agencies with tsunami mitigation and recovery activities.'';

(2) in subsection (c)—

(A) by striking paragraph (1) and redesignating paragraphs (2) and (3) as paragraphs (1) and (2), respectively; and

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

(i) by striking ''the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico, that are determined—'' and inserting ''the Pacific, Arctic, and Atlantic Oceans, including the Caribbean Sea and Gulf of Mexico, that are determined to pose significant risks of tsunami for States and United States territories along the coastal areas of such regions; and''; and

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

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

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

''(d) TSUNAMI WARNING ALERT LEVEL EVALUATION.—The Administrator, in collaboration with social scientists, emergency personnel, and high-risk communities, shall—

''(1) evaluate tsunami alert levels terminology, timing, and effectiveness;

''(2) determine if such alerts produce the desired response and understanding from possible tsunami-prone communities; and

''(3) if necessary, update the alert level system for increased effectiveness.'';

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

(A) in paragraph (1)—

(i) in the matter preceding subparagraph (A), by inserting ''responsible for Alaska, the continental United States, Hawaii, United States territories, and international entities the Administrator determines appropriate'' before the period;

(ii) in subparagraph (A), by striking ''which is primarily responsible for Alaska and the continental United States''; and

(iii) in subparagraph (B), by striking '', which is primarily responsible for Hawaii, the Caribbean, and other areas of the Pacific not covered by the National Center'';

(B) in paragraph (2)—

(i) in subparagraph (A), by inserting ''current,'' after ''sea level,'';

(ii) in subparagraph (B), by striking ''and volcanic eruptions'' and inserting ''volcanic eruptions, or other sources'';

(iii) in subparagraph (C), by striking ''buoy data and tidal'' and inserting ''and coastal'';

(iv) in subparagraph (E), by striking ''Integrated Ocean Observing System of the Administration'' and inserting ''United States and global ocean and coastal observing system'';

(v) in subparagraph (H), by inserting ''monitoring needs,'' after ''response,''; and

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

''(I) Providing a Tsunami Warning Coordinator to coordinate with partners and stakeholders products and services of the centers supported or maintained under paragraph (1).'';

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

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

(D) in paragraph (4)—

(i) by amending the matter preceding subparagraph (A) to read as follows: ''The Administrator shall coordinate with the weather forecast offices of the National Weather Service, the centers supported or maintained under paragraph (1), and such national and regional program offices of the Administration as the Administrator or the coordinating committee, as established in section 805(b), consider appropriate to ensure that regional and local weather forecast offices—'';

(ii) in subparagraph (B), by striking ''and'' after the semicolon;

(iii) in subparagraph (C), by striking the period and inserting ''; and''; and

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

''(D) conduct education and outreach efforts to help prepare coastal communities for tsunami hazards.'';

(E) in paragraph (5)—

(i) in the heading, by striking ''UNIFORM'' and inserting ''STANDARDIZED'';

(ii) in subparagraph (A), by striking ''uniform'' and inserting ''standardized'';

(iii) in subparagraph (C)(ii), by striking ''uniform'' and inserting ''standardized'';

(iv) in subparagraph (D), by striking ''and'' after the semicolon;

(v) in subparagraph (E), by striking the period and inserting ''; and''; and

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

''(F) align the analytic techniques and methodologies of the existing tsunami warning centers supported or maintained under paragraph (1) to ensure seamless continuity of operations and mitigate risk of operational failure by prioritizing investments that include—

''(i) replacing end of life equipment;

''(ii) ensuring product consistency;

''(iii) enabling consistent operational process for backup capabilities;

''(iv) mitigating existing operational security risks; and

''(v) meeting information security requirements specified in chapter 35 of title 44, United States Code.''; and

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

''(7) REPORTING.—Not later than 180 days after the date of the enactment of this paragraph and annually thereafter until such time as all relevant requirements have been satisfied, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an update briefing on the progress of the following:

''(A) Standardizing products and procedures under paragraph (5), including tsunami assessments, forecast guidance, and related products.

''(B) Migrating the message generation systems of the centers supported or maintained under paragraph (1) to the Advanced Weather

Information Processing Systems, or successor systems.

''(C) The structural reorganization effort, if necessary, to align such centers' organizational charts.

''(D) The expected timeline for the full completion of standardizing such centers' products and procedures.'';

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

(A) in paragraph (1)—

(i) in the matter preceding subparagraph (A), by inserting ''detect, measure, and'' after ''used to'';

(ii) in subparagraph (B), by striking ''and'' after the semicolon;

(iii) in subparagraph (C), by striking ''and the Advanced National Seismic System;'' and inserting ''the Advanced National Seismic System, and the global navigation satellite system (GNSS); and''; and

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

''(D) ensure research is coordinated with tsunami warning operations;''; and

(B) in paragraph (3), by inserting ''according to industry best practices'' before the period; and

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

(e) NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM.—Section 805(c) of the Tsunami Warning, Research, and Education Act (33 U.S.C. 3204(c)) is amended—

(1) in paragraph (5)—

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

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

''(B) Coastal digital elevation models (DEMs) to support the development of inundation maps.''; and

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

''(I) Evaluation of the variation of inundation impact resulting from tsunami-driven sediment transport.

''(J) Evaluation of tsunami debris impact on critical infrastructure (as such term is defined in section 1016(e) of Public Law 107–56 (42 U.S.C. 5195c(e))) and lifelines.

''(K) High-resolution and high-quality digital elevation models needed for at-risk coastlines, ports, and harbors, particularly for regions not covered by existing inundation maps.''; and

(2) in paragraph (7)(C), by inserting ''and behavioral'' after ''social''.

(f) TSUNAMI RESEARCH PROGRAM.—Section 806 of the Tsunami Warning, Research, and Education Act (33 U.S.C. 3205) is amended—

(1) in subsection (a)—

(A) by striking ''section 805(d)'' and inserting ''section 805(b)''; and

(B) by inserting ''and management'' after ''data collection'';

(2) in subsection (b)—

(A) in paragraph (1), by inserting ''deployment and'' after ''may include'';

(B) in paragraph (3), by striking ''social science research'' and inserting ''social and be-

havioral science research, including data collection,'';

(C) in paragraph (4), by striking ''and'' after the semicolon;

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

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

''(5) develop decision support tools;

''(6) leverage and prioritize research opportunities; and''; and

(3) by adding at the end the following new subsection:

''(c) RESEARCH AND DEVELOPMENT PLAN.—Not later than 12 months after the date of the enactment of this subsection and not less frequently than every 36 months thereafter, the Administrator, in consultation with the Interagency Council for Advancing Meteorological Services, shall develop a research and development and research to operations plan to improve tsunami detection and forecasting capabilities that—

''(1) identifies and prioritizes research and development priorities to satisfy section 804;

''(2) identifies key research needs for better detecting tsunamis that may occur in open ocean and

along the coastlines of the United States and its territories, improve forecasting of tsunamis that are not seismically driven, and other opportunities determined appropriate;

''(3) develops plans for transitioning research to operations; and

''(4) identifies collaboration opportunities that may further and align tsunami research, development, warnings, and operations between the centers supported or maintained under section 804, the National Tsunami Hazard Mitigation Program, the National Oceanic and Atmospheric Administration Center for Tsunami Research, the National Science Foundation, the United States Geological Survey, the Federal Emergency Management Agency, institutions of higher education, private entities, stakeholders, and others determined appropriate.''.

(g) ASSESSMENT OF TSUNAMI WATCHES AND WARNINGS.—

(1) IN GENERAL.—The Tsunami Warning, Research, and Education Act (enacted as title VIII of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109–479)) is amended by inserting after section 804 (33 U.S.C. 3203) the following new section:

"SEC. 804A. ASSESSMENT OF TSUNAMI WATCHES AND WARNINGS.

"(a) ASSESSMENT OF TSUNAMI WATCHES AND WARNINGS.—

"(1) IN GENERAL.—Not later than two years after the date of the enactment of this section, the Under Secretary shall—

"(A) conduct an assessment of—

"(i) the tsunami watches and warnings of the National Weather Service; and

"(ii) the information delivery to support preparation and responses to tsunamis; and

"(B) submit to Congress a report on the findings of the Under Secretary with respect to the assessment required by subparagraph (A).

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

"(A) An evaluation of whether the watches, warnings, and information described in paragraph (1)(A) effectively—

"(i) communicate risk to the general public;

"(ii) inform action to prevent loss of life and property;

"(iii) inform action to support tsunami preparation and response; and

"(iv) deliver information in a manner designed to lead to appropriate action.

"(B) Subject to subsection (b)(2), such recommendations as the Under Secretary may have for—

"(i) legislative and administrative action to improve the watches and warnings described in paragraph (1)(A)(i); and

"(ii) such research as the Under Secretary considers necessary to address the focus areas described in paragraph (3).

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

"(A) Ways to communicate the risks posed by hazardous tsunami events to the public that are most likely to result in informed decision-making regarding the mitigation of such risks.

"(B) Ways to provide actionable geographic information to the recipient of a watch or warning for tsunami, including partnering with emergency response agencies, as appropriate.

''(C) Evaluation of information delivery to support the preparation for and response to tsunamis.

''(4) CONSULTATION.—In conducting the assessment required by paragraph (1)(A), the Under Secretary shall consult with the following:

''(A) Individuals in the academic sector, including individuals in the field of social and behavioral sciences.

''(B) Other weather services.

''(C) Media outlets and other entities that distribute the watches and warnings described in paragraph (1)(A)(i).

''(D) Emergency planners and responders, including State, local, and Tribal emergency management agencies.

''(E) Other government users of the watches and warnings described in paragraph (1)(A)(i), including the Federal Highway Administration.

''(F) Such other Federal agencies as the Under Secretary determines rely on watches and warnings regarding tsunamis for operational decisions.

''(5) METHODOLOGIES.—In conducting the assessment required by paragraph (1)(A), the Under Secretary shall use such methodologies as the Under Secretary considers generally accepted by the weather enterprise (as such term is defined in section 2 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501)), including social and behavioral sciences.

''(b) IMPROVEMENTS TO TSUNAMI WATCHES AND WARNINGS.—

''(1) IN GENERAL.—Based on the assessment required by subsection (a)(1)(A), the Under Secretary shall make such improvements to the watches and warnings described in such subsection as the Under Secretary considers necessary to—

''(A) improve the communication of the risks posed by tsunami events; and

''(B) provide actionable geographic information to the recipient of a watch or warning for a tsunami.

''(2) REQUIREMENTS REGARDING RECOMMENDATIONS.—In conducting the assessment required by subsection (a)(1)(A), the Under Secretary shall ensure that any recommendation under sub-

section (a)(2)(B) that the Under Secretary considers a major change—

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

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

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

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

(2) CLERICAL AMENDMENT.—The table of contents for the Tsunami Warning, Research, and Education Act (enacted as title VIII of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109–479)) is amended by inserting after the item relating to section 804 the following new item:

"Sec. 804A. Assessment of tsunami watches and warnings.".

(h) GLOBAL TSUNAMI WARNING AND MITIGATION NETWORK.—Section 807(d) of the Tsunami Warning, Research, and Education Act (33 U.S.C. 3206(d)) is amended by inserting "and management" after "data sharing".

(i) TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY PANEL.—Section 808 of the Tsunami Warning, Research, and Education Act (33 U.S.C. 3206a) is amended—

(1) in subsection (b)(1), by inserting ''and behavioral'' after ''social''; and

(2) by adding at the end the following new subsection:

''(e) SUNSET.—The Panel shall terminate not later than six years after the date of the enactment of the Weather Act Reauthorization Act of 2025.''.

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

''SEC. 809. AUTHORIZATION OF APPROPRIATIONS.

''There are authorized to be appropriated to the Administrator to carry out this title $30,000,000 for each of fiscal years 2026 through 2030, of which—

''(1) not less than 27 percent of the amount appropriated for each such fiscal year shall be for activities conducted at the State level under the national tsunami hazard mitigation program under section 805; and

''(2) not less than eight percent of the amount appropriated shall be for the tsunami research program under section 806.''.

SEC. 106. OBSERVING SYSTEM PLANNING.

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

(1) in paragraph (3)—

(A) by inserting ''Federal'' before ''observing capabilities''; and

(B) by striking ''and'' after the semicolon;

(2) in paragraph (4)—

(A) by inserting '', including private sector partnerships or commercial acquisition,'' after ''options''; and

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

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

''(5) compare costs and schedule, including cost-benefit analysis, of Federal and private sector supplemental options to fill the observation data requirements under paragraph (1) and gaps identified pursuant to paragraph (3); and

''(6) not later than one year after the date of the enactment of the Weather Act Reauthorization Act of 2025, submit to Congress a report that provides an analysis of the technical, schedule, cost, and cost benefit analyses to place an operational polar-

orbiting environmental satellite capability in the early morning orbit to support the weather enterprise and the Administration's mission.''.

SEC. 107. OBSERVING SYSTEM SIMULATION EXPERIMENTS.

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

(1) in subsection (b)(3), by striking ''providing data'' and inserting ''comparison to current or experimental commercial system capabilities that provide data'';

(2) in subsection (c)(1), by striking '', including polar-orbiting and geostationary satellite systems,'';

(3) by striking subsection (d); and

(4) by redesignating subsection (e) as subsection (d).

SEC. 108. COMPUTING RESOURCES PRIORITIZATION.

(a) COMPUTING RESEARCH INITIATIVE.—Section 108 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8518) is amended by striking subsection (a)(3)(C) and all that follows through subsection (b)(7) and inserting the following:

''(b) ARTIFICIAL INTELLIGENCE INVESTMENTS.—The Under Secretary shall leverage artificial intelligence and machine learning technologies to facilitate, optimize,

and further leverage advanced computing to accomplish critical missions of the National Oceanic and Atmospheric Administration.

''(c) CENTERS OF EXCELLENCE.—The Under Secretary may expand, and where applicable establish, centers of excellence to aid the adoption of next-generation artificial intelligence and machine learning enabled advanced computing capabilities. Each such center may carry out activities that include the following:

''(1) Leveraging robust public-private partnership models to provide access to training, experience, and long-term development of workforce and infrastructure.

''(2) Developing and optimizing tools, libraries, algorithms, data structures, and other supporting software necessary for specific applications on high-performance computing systems.

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

''(4) To the maximum extent practicable, exploring quantum computing and related application partnerships with public, private, and academic enti-

ties to improve the accuracy and resolution of weather predictions.

''(d) MULTI-YEAR CONTRACTS.—The Under Secretary may enter into multi-year contracts in accordance with section 3903 of title 41, United States Code, and shall ensure compliance with all contract clauses provided in such section to support operations, research, and development related to high performance and cloud computing infrastructure or systems with an unfunded contingent liability in the event of cancellation.

''(e) REPORT.—Not later than two years after the date of the enactment of the Weather Act Reauthorization Act of 2025, the Under Secretary, in collaboration with the Secretary of Energy shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation and the Committee on Energy and Natural Resources of the Senate a report evaluating the following:

''(1) A best estimate of the overall value of high-resolution probabilistic forecast guidance for hazardous weather or water events (as such term is defined in section 401 of the Weather Act Reauthorization Act of 2025) using a next-generation weather forecast and warning framework.

''(2) The needs for cloud computing, quantum computing, or high-performance computing, visualization, and dissemination collaboration between the Department of Energy and the National Oceanic and Atmospheric Administration.

''(3) A timeline and guidance for implementation of the following:

''(A) High-resolution numerical weather prediction models.

''(B) Methods for meeting the cloud computing, quantum computing, or high-performance computing, visualization, and dissemination needs identified under paragraph (2).''.

(b) STRATEGIC PLAN ON HIGH-PERFORMANCE COMPUTING AND DATA MANAGEMENT NEEDS.—

(1) IN GENERAL.—The Under Secretary shall make publicly available not later than one year after the date of the enactment of this Act, and update every five years thereafter until 2035, a 10-year strategic plan that outlines the high-performance computing and data management requirements and needs of the National Oceanic and Atmospheric Administration and actions and strategies to address such requirements and needs.

(2) PLAN ELEMENTS.—At a minimum, the strategic plan required by paragraph (1) shall include the following:

(A) A 10-year prospective outlook of computing resources and upgrades needed to meet the mission needs of the National Oceanic and Atmospheric Administration for fisheries management, oceanographic forecasting, and ecological forecasting missions.

(B) A discussion of the following:

(i) Computing and processing resources of the Administration and a 10-year projected need for such resources, disaggregated by line office of the Administration.

(ii) Facilities, commercial contracts, and partnerships (with other Federal agencies or other institutions or entities) of the Administration that are providing computing and data management support or capacity as of such date.

(iii) The use by the Administration of cloud computing and other emerging technologies, such as artificial intelligence and machine learning.

(iv) Additional technologies that have the potential to increase effectiveness and efficiency for data storage and processing power, including challenges to access and use of such technologies.

(v) The distribution of computing resources among the operations and research functions of the Administration.

(vi) Products and services of the Administration that have not become available to the public because of a lack of computing resources.

(vii) Current and future workforce development needs, such as information technology and software engineering, of the Administration.

(viii) The high-performance computing requirements of the Administration, with a special focus on requirements that are common across line offices of the Administration.

(C) Timelines, and performance measures for assessing progress toward attaining goals for the following:

(i) Computing infrastructure and architecture of the Administration (including facilities, hardware, and software).

(ii) Use by the Administration of technologies that will increase effectiveness and efficiency for data storage and processing power, including challenges to access and use of such technologies.

(D) A 10-year life cycle analysis of the management of facilities, hardware, and engineering involved in the strategic plan that includes the following:

(i) Program formulation for project conception, implementation, and closure.

(ii) Technical infrastructure, products, processes, data, and personnel resources required to achieve defined cost, schedule, and performance objectives.

(E) If appropriate, a description of actions taken to implement the previous plan.

(3) PUBLIC INVOLVEMENT.—In developing the strategic plan required by paragraph (1), the Under Secretary shall invite comments and other feedback from the public to inform the strategic plan.

(4) ANNUAL BRIEFINGS.—

(A) IN GENERAL.—Not later than one year after the date of the enactment of this Act and annually thereafter until 2030, the Under Secretary shall brief Congress on the progress made toward the objectives of the strategic plan required by paragraph (1).

(B) ELEMENTS.—Each briefing required by subparagraph (A) shall include the following:

(i) An evaluation of the progress made in implementing the strategic plan.

(ii) Such updates to the strategic plan as the Under Secretary considers appropriate.

SEC. 109. EARTH PREDICTION INNOVATION CENTER.

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

(1) in subparagraph (D), by striking ''and'' after the semicolon; and

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

''(E) developing community weather research modeling systems that—

''(i) are accessible by the public in accordance with section 10601 of the James

M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (15 U.S.C. 8512a) and available for archive and long-term study;

''(ii) meet basic end-user requirements for running on public computers and networks located outside of secure National Oceanic and Atmospheric Administration information and technology systems;

''(iii) use, whenever appropriate and cost-effective, innovative strategies and methods, including cloud-based computing capabilities, for hosting and management of part or all of the system described in this subparagraph;

''(iv) use modeling systems that allow for interoperability with new model components, modules, and next-generation software and coding languages;

''(v) allow for open testing and integration of promising operational model improvements from the broader community;

''(vi) access as close to a real-time basis as possible operational data and metadata, including commercially pur-

chased data for use in the model testing conducted by the Earth Prediction Innovation Center pursuant to redistribution restrictions, licensing agreements, and applicable existing laws and regulations; and

''(vii) provide supported and portable versions of the unified forecast system, including applications for fire weather, subseasonal to seasonal forecasting, hurricane, space weather, ocean, cryosphere, air quality, and coastal models, that can reproduce current operational global and regional model prediction; and

''(F) establishing a National Oceanic and Atmospheric Administration Data Lake, to be maintained by the Administration, a commercial partner, or non-profit entity, that consolidates and maintains a publicly available and continuously updated collection of data and metadata used in numerical weather prediction for use in the Earth Prediction Innovation Center's model testing, pursuant to redistribution restrictions, licensing agreements, and applicable existing laws and regulations.''.

SEC. 110. SATELLITE ARCHITECTURE PLANNING.

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

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

(2) by amending subsection (b) to read as follows:

''(b) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITE SYSTEMS AND DATA.—

''(1) IN GENERAL.—The Under Secretary shall maintain a fleet of National Oceanic and Atmospheric Administration space-based observation platforms that provide critical operations-focused data and information to support the mission of the Administration to monitor the global environment in order to protect lives and property from extreme weather and other natural phenomena.

''(2) COLLABORATION.—The Under Secretary shall implement recommendations from the National Oceanic and Atmospheric Administration Observing Systems Council to ensure an appropriate mix of government, academic, commercial sector, and international partnerships in the provision of data and information, including a broadened effort on data

acquisition through the Commercial Data Program under section 302 when cost-effective and beneficial to the Administration.

''(3) PRIORITY.—The Under Secretary shall ensure that platforms maintained under paragraph (1) prioritize the development of products and services that are tailored to meet the National Oceanic and Atmospheric Administration's mission.

''(4) NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION.—The Under Secretary shall maintain the National Centers for Environmental Information to provide a long-term archive and access to the national and global data and metadata of the National Oceanic and Atmospheric Administration.''; and

(3) in subsection (f)(1), by striking ''2023'' and inserting ''2030''.

SEC. 111. IMPROVING UNCREWED ACTIVITIES.

(a) RESEARCH AND DEVELOPMENT.—Section 102(b)(3) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8512(b)(3)) is amended—

(1) in subparagraph (B), by striking ''aerial'' and inserting ''crewed and uncrewed aerial and surface''; and

(2) in subparagraph (G), by striking '', including commercial observing systems'' and inserting '',

including stationary and mobile commercial observing systems, such as uncrewed aircraft and marine systems, to provide observations of the atmosphere and ocean, and other observations, in cooperation with the Office of Marine and Aviation Operations''.

(b) USE OF UNCREWED AERIAL SYSTEMS.—Section 102 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8512) is amended by—

(1) redesignating subsections (c) and (d) as subsections (d) and (e), respectively; and

(2) by inserting after subsection (b) the following new subsection:

''(c) USE OF UNCREWED AERIAL SYSTEMS.—

''(1) IN GENERAL.—The Assistant Administrator for Oceanic and Atmospheric Research and the Assistant Administrator for the Office of Marine and Aviation Operations, whenever practical, shall use uncrewed aerial systems to assess damage and assist recovery after an extreme weather or water event.

''(2) USE OF SYSTEMS.—The Assistant Administrator for Oceanic and Atmospheric Research and the Assistant Administrator for the Office of Marine and Aviation Operations may acquire uncrewed aerial systems and training resources for the regional

offices and partners of the National Oceanic and Atmospheric Administration for the use and deployment of such systems in storm assessments and response.''.

SEC. 112. INTERAGENCY COUNCIL FOR ADVANCING METEOROLOGICAL SERVICES.

(a) IN GENERAL.—Section 402 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8542) is amended—

(1) in subsection (a), in the matter preceding paragraph (1), by—

(A) striking ''Advancing Weather Services'' and inserting ''Advancing Meteorological Services (in this section referred to as the 'Interagency Council')''; and

(B) striking ''Committee'' each place it appears and inserting ''Council'';

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

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

''(c) FURTHER COORDINATION.—The Director of the Office of Science and Technology Policy shall take such steps as are necessary to coordinate the activities of the Federal Government with stakeholders in the United States weather industry, academic partners, State governments, and emergency managers, including by implementing mechanisms to encourage and enable the participation of non-Federal employees in the functions of the Interagency Council.''; and

(3) by adding at the end the following new subsections:

''(d) FUNCTIONS.—The Interagency Council shall be the formal mechanism by which all relevant Federal departments and agencies coordinate implementation of policy and practices to ensure United States global leadership in meteorological services. In doing so, the Interagency Council shall review programs and support relevant weather research and forecast innovation activities, as well as other related implementation activities, related to Federal meteorological services, including by carrying out the following:

''(1) Identifying and helping prioritize meteorological research and service delivery needs, including relating to observations, operational systems, communications, and infrastructure.

''(2) Providing recommendations to streamline or consolidate activities and develop greater efficiencies in cross-agency activities.

''(3) Leveraging Earth system science research outcomes of the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and other relevant Federal departments and agencies, including research outcomes related to the relevant recommended key science and applications questions and priorities in the National Academies of Sciences, Engineering, and Medicine's 2018 report 'Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space', to understand and predict high-impact weather phenomena.

''(4) Facilitating the expansion and strengthening of partnerships with private sector entities to advance meteorological research, communications, and computing in collaboration with the Earth system science, service, and stakeholder communities.

''(5) Sharing information regarding meteorological research improvement needs and science opportunities across relevant Federal departments and agencies.

''(6) Providing advice to all relevant Federal departments and agencies regarding potential collaborations and expected level of resources needed to maintain and operate the Interagency Council.

''(7) Enhancing communication and coordination and promoting sharing within relevant Federal departments and agencies and across the Interagency Council.

''(8) Developing, recruiting, and sustaining a professional and diverse workforce for meteorological research and services.

''(e) DATA INVENTORY.—The Interagency Council, in coordination and avoidance of duplication with the United States Group on Earth Observations, shall promote data and metadata access and archive activities to increase accessibility, interoperability, and reusability by maintaining a data inventory of meteorological observations. Not less frequently than every two years for a period of 10 years beginning on the date of the enactment of this subsection, the Interagency Council shall solicit updated information from private sector entities identifying current and near future sources of such data. Such data shall be made available to member departments and agencies under subsection (a).

''(f) COORDINATION OFFICE.—The Interagency Meteorological Coordination Office shall provide to the Interagency Council such administrative and logistical support as the Interagency Council may require, as determined by the co-chairs.

''(g) COST SHARE.—Member departments and agencies specified in subsection (a) may provide reimbursable financial support to the Interagency Meteorological Coordinating Office to enhance cost-sharing and collaboration related to weather research and forecast innovation activities.

''(h) REPORT.—Not later than one year after the date of the enactment of this subsection and annually thereafter until 2030, the Interagency Council shall publish a report which identifies among member departments and agencies specified in subsection (a) the following:

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

''(2) Federal programs that acquire such observations, data, and capabilities from private sector entities.

''(3) Advancements in meteorological data collection, assimilation, and forecasting that could improve Federal programmatic operational capabilities.

''(4) Barriers to acquiring meteorological observations, data sources, and capabilities that could be used to better meet Federal programmatic needs.''.

(b) REFERENCES.—Any reference to the Interagency Committee for Advancing Weather Services in any law, rule, regulation, paper, document, map, or other record of the United States shall be deemed to be a reference to the Interagency Council for Advancing Meteorological Services.

SEC. 113. OCEAN OBSERVATIONS.

Subsection (b) of section 12304 of the Integrated Coastal and Ocean Observation System Act of 2009 (33 U.S.C. 3603) is amended by adding at the end the following new paragraph:

''(5) SHIPS OF OPPORTUNITY PILOT PROGRAM.—

''(A) IN GENERAL.—The Administrator, in coordination with the heads of relevant Federal departments and agencies, shall, subject to relevant regulations and certifications, maintain pilot programs or projects to contract with research or commercial ship operators for data collection and assess the potential costs, benefits, and viability of a network of ocean and atmospheric observing instruments operating on

research or commercial ocean vessels, including in the Arctic, in order to supplement the Integrated Coastal, Great Lakes, and Ocean Observation System in improving understanding of coastal and ocean systems and their relationships to human activities.

''(B) STANDARDS AND SPECIFICATIONS.—The Administrator shall ensure that data acquired through the pilot program or projects under subparagraph (A) meets the most recent standards and specifications required for observation services and data as published pursuant to subsection (c) of section 302 of the Weather Research and Forecasting Innovation Act of 2017.

''(C) REPORT.—Not later than five years after the date of the enactment of this paragraph, the Administrator, in consultation with the Secretary of Transportation, shall submit to Congress a report on the requirements for a global network of ocean and atmospheric instruments operating on research or commercial ocean vessels for measurement and data transmission.

''(D) SUNSET.—This paragraph shall terminate on the earlier of—

''(i) September 30, 2030; or

''(ii) one year after the date on which the report required under subparagraph (B) is submitted by the Administrator.''.

SEC. 114. CONSOLIDATION OF REPORTS.

(a) WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2017.—

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

(A) in section 102 (15 U.S.C. 8512), by striking subsection (e) (as redesignated pursuant to section 111(b));

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

''SEC. 105. WEATHER RESEARCH AND DEVELOPMENT PLANNING.

''Not later than two years after the date of the enactment of this section and not less frequently than every two years thereafter, the Under Secretary, acting through the Assistant Administrator for Oceanic and Atmospheric Research, and in coordination with the Director of the National Weather Service and the Assistant Administrator for Satellite and Information Services, shall issue a re-

search and development and research to operations plan to maintain United States leadership in numerical weather prediction and forecasting that—

''(1) describes the forecasting skill and technology goals, technology transfer plan, and progress of the National Oceanic and Atmospheric Administration in carrying out the program conducted under section 102;

''(2) identifies and prioritizes specific research and development activities, data collection and analysis, predictive modeling, demonstration of potential operational forecast application, education, training, and performance metrics, weighted to meet the operational weather and flood-event mission of the National Weather Service to achieve a weather-ready Nation;

''(3) describes how the program conducted under section 102 will collaborate with Federal agencies and departments, international partners, and stakeholders, including the United States weather industry and academic partners, and the role of each in advancing weather forecasting and communication;

''(4) identifies, through consultation with the National Science Foundation, the United States

weather industry, and academic partners, research necessary to advance the scientific understanding of weather processes and provide information to improve weather warning and forecast systems in the United States most effectively;

''(5) describes the ongoing research projects of the United States Weather Research Program, the goals of such projects, and projects related to weather observations, short-term weather, or subseasonal forecasts within the Office of Oceanic and Atmospheric Research that are closest to operationalization; and

''(6) describes how the National Oceanic and Atmospheric Administration is advancing community weather modeling.'';

(C) in section 403 (15 U.S.C. 8543)—

(i) in subsection (a), by inserting ''the'' after ''Director of''; and

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

''(d) ANNUAL BRIEFING.—Not less frequently than once each year, the Under Secretary shall brief the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on participation

in the program under subsection (a) and shall highlight any innovations that come from the interaction described in subsection (b).''; and

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

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

''Sec. 408. Weather enterprise outreach.
''Sec. 409. Hurricane hunter aircraft.''.

(b) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AUTHORIZATION ACT OF 1992.—The National Oceanic and Atmospheric Administration Authorization Act of 1992 (Public Law 102–567) is amended—

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

(2) in section 108 (15 U.S.C. 8520)—

(A) in subsection (a)—

(i) by striking paragraph (5); and

(ii) by redesignating paragraphs (6) through (12) as paragraphs (5) through (11), respectively;

(B) by striking subsection (b); and

(C) by redesignating subsection (c) as subsection (b).

SEC. 115. PRECIPITATION FORECAST IMPROVEMENT PROGRAM.

(a) IN GENERAL.—Title VI of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501 et seq.) is amended—

(1) by redesignating section 603 as section 604; and

(2) by inserting after section 602 the following new section:

"SEC. 603. PRECIPITATION FORECAST IMPROVEMENT PROGRAM.

''(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry, other Federal agencies, and academic partners, shall maintain a program to improve precipitation forecasting across timescales.

''(b) GOAL.—The goal of the program under subsection (a) shall be to provide more accurate, reliable, and timely precipitation forecasts across timescales through the development and application of a fully coupled Earth system prediction model in order to reduce the loss of life or property related to precipitation extremes, with a focus on the following:

''(1) Improving the understanding and prediction of precipitation extremes from a variety of weather systems, including atmospheric rivers.

''(2) Evaluating and incorporating, as appropriate, innovative observations into operational monitoring and forecast systems to improve precipitation forecasts.

''(3) Improving Earth system model predictions of precipitation extremes from atmospheric rivers, tropical cyclones, summer-time thunderstorms, winter storms, and other phenomena, in coordination with relevant programs.

''(4) Enhancing research transition to operations through testbeds, including the evaluation of physical and social science, technology, and other research to develop products and services for implementation and use by relevant stakeholders.

''(5) Incorporating social, behavioral, and economic sciences best practices into operations for more effective and actionable watch and warning products that help drive public safety and damage mitigation decisions in coordination with the programs established in accordance with this Act.

''(6) Ensuring data and metadata management processes are in place to support data access and ar-

chive for long-term research and operations among multiple partners.

''(c) ACTIVITIES.—In carrying out the program under subsection (a), the Under Secretary shall support research-to-operations work, including relating to the following:

''(1) Implementing key strategies and following priorities and objectives outlined by the National Oceanic and Atmospheric Administration's 'Precipitation Prediction Grand Challenge Strategy'.

''(2) Improving the physical science, operational modeling and tools, and technology related to better forecasting precipitation extremes across timescales.

''(3) Improving the social, behavioral, risk, communications, and economic sciences related to vulnerabilities, risk communication, and delivery of information critical for reducing the loss of life or property related to extreme precipitation.

''(4) Conducting the research necessary to develop and deploy probabilistic weather forecast guidance technology relating to precipitation extremes in operational practice.

''(5) Enhancing the operational capacity of the National Weather Service to deliver decision support for increasing precipitation extremes.

''(6) Expanding computational resources to improve precipitation modeling.

''(d) ANNUAL BUDGET.—The Under Secretary shall, not less frequently than annually, submit to Congress a proposed budget corresponding with carrying out this section.

''(e) SENSE OF CONGRESS.—It is the sense of Congress that improved precipitation forecasts should support improved water resource management and resilience to extreme water-related events, such as floods and drought, which may include the use of enhanced streamflow prediction.''.

(b) CLERICAL AMENDMENT.—The table of contents in section 1(b) of the Weather Research and Forecasting Innovation Act of 2017 is amended by striking the item relating to section 603 and inserting the following new items:

''Sec. 603. Precipitation forecast improvement program.
''Sec. 604. Definitions.''.

TITLE II—ENHANCING FEDERAL WEATHER FORECASTING AND INNOVATION

SEC. 201. WEATHER INNOVATION FOR THE NEXT GENERATION.

(a) IN GENERAL.—Not later than 180 days after the date of the enactment of this Act, the Under Secretary

shall establish a Research, Development, Test, and Evaluation Program (in this section referred to as the ''Program'') to ensure the continued performance of weather radar capabilities based on defined use needs and requirements, including capabilities currently being developed.

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

(1) Partner with the private sector, academia, Federal, State, and local government entities, and any other entity the Under Secretary considers appropriate.

(2) Identify, evaluate, and test existing or emerging technologies and solutions that improve radar coverage and performance, including by mitigating the potential impact of interferences on weather radar.

(3) To the maximum extent practicable, research additional solutions that could improve radar coverage and performance and mitigate the effects of interferences on weather radar, such as the following:

(A) Signal processing algorithms, including the capability to merge data from multiple ra-

dars, including commercial radars, and other supplemental data sources.

(B) Short-term forecasting algorithms to improve weather and water-related forecasts and warnings.

(C) Gap filling radars to improve radar coverage and provide supplemental or replacement observations in areas impacted by interferences on weather radar.

(D) Solutions to replace or mitigate the effects of data contaminated by interferences on weather radar.

(E) Solutions from electromagnetic sources.

(4) Develop, support, or partner with developers to provide commercially viable technical mitigation solutions for interferences to weather radar capabilities that are compatible with the operational requirements of the weather radar system.

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

(1) Phased array weather radar systems.

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

(3) The use of data from meteorological towers associated with the private sector, or similar capabilities.

(4) The installation and provision of access to rain gauges.

(5) Any other technology-based mitigation solution the Under Secretary determines could improve radar coverage by overcoming interferences, beam blockage, or ghost echoes.

(d) REPORT; RECOMMENDATION.—

(1) IN GENERAL.—Not later than two years after the date of the enactment of this section and annually thereafter until the Program terminates pursuant to subsection (e), the Under Secretary shall submit to Congress a report on the implementation of the Program, including an evaluation of each technology-based mitigation solution identified for priority consideration pursuant to subsection (c), and a recommendation regarding additional identification and testing of new technologies based on such consideration.

(2) FINAL RECOMMENDATION.—Not later than five years after the date of the enactment of this section, the Under Secretary shall provide to Congress a recommendation on whether additional re-

search, testing, and development through the Program established under subsection (a) is needed, and a determination of whether a cessation of field research, testing, development and evaluation under the Program is appropriate.

(e) TERMINATION.—The authority of the Under Secretary to carry out the Program shall terminate on the earlier of—

(1) September 30, 2030; or

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

(f) DEFINITIONS.—In this section:

(1) GHOST ECHO.—The term ''ghost echo'' means radar signal reflectivity or velocity return errors in radar data due to the proximity of an interference.

(2) INTERFERENCE.—The term ''interference'' means any natural or human-built structure that affects a weather radar system, including any wind turbine or building that could disrupt or limit the effectiveness of a weather radar system.

SEC. 202. RADAR NEXT PROGRAM.

(a) IN GENERAL.—The Under Secretary, in consultation with the Director of the National Weather Service,

shall establish a program to be known as the ''Radar Next Program'' (in this section referred to as the ''program'').

(b) REQUIREMENTS.—In carrying out the program, the Under Secretary shall carry out the following:

(1) Develop performance and coverage requirements for the weather radar network of the United States, including the territories of the United States.

(2) Collaborate with the weather enterprise to determine potential solutions to update the weather radar network of the United States that meets the requirements developed under paragraph (1).

(3) Develop a plan in accordance with subsection (c).

(c) PLAN.—

(1) IN GENERAL.—The Under Secretary shall develop a plan to replace the Next Generation Weather Radar of the National Weather Service system in existence as of the data of the enactment of this Act (in this subsection referred to as the ''NEXRAD system'').

(2) ELEMENTS.—The plan developed under this subsection shall seek to continue and improve weather radar coverage in the United States and its territories, and include the following:

(A) Estimates of quantifiable improvements in performance, coverage, and accuracy to be made from potential options for replacement of the NEXRAD system.

(B) Development of a proof-of-concept phased array radar to test and determine the specifications and requirements for such replacement.

(C) Expected actions needed to implement the recommendations of the report published by the Environmental Information Services Working Group of the Science Advisory Board of the National Oceanic and Atmospheric Administration in November 2023 and entitled ''A NESDIS Observing System Backbone Framework'' to assist in defining a radar backbone architecture that will best serve the United States.

(D) Establishment of a weather surveillance radar testbed for the following:

(i) Evaluation of commercial radars with the potential to replace or supplement the NEXRAD system.

(ii) Providing technical assistance for the use of small, gap-filling radars with

private and local partners in regions where geographical topography prevents the full use of large systems or in locations where such systems may not be commercially viable.

(E) Consultation and input solicited from academia, meteorologists, emergency managers, and public safety or utility officials regarding the specifications and requirements for replacement of the NEXRAD system.

(F) Prioritized locations for initial deployment of the system that will replace the NEXRAD system.

(G) Expected locations of the system that will replace the NEXRAD system, including sites located more than 75 miles away from an existing NEXRAD system station and additional appropriate locations.

(H) Expected or planned improvements to data available for weather and water-related forecasts and warnings from the system that will replace the NEXRAD system.

(3) PROCUREMENT DEADLINE.—The Under Secretary shall take such actions as may be necessary to ensure the plan developed under this sub-

section is fully implemented and executed by not later than September 30, 2040.

(d) RADAR-AS-A-SERVICE.—

(1) IN GENERAL.—The Under Secretary may partner or contract with entities outside of the National Oceanic and Atmospheric Administration to fill data gaps in weather radar coverage using diverse weather radars and data assimilation technologies in order to accomplish the following:

(A) Supplement data gaps in weather radar coverage, including at low levels and wide areas, in existence as of the date of the enactment of this Act.

(B) Ensure the continued performance of the United States weather radar network.

(C) Better detect significant precipitation and severe weather over a greater area across a population.

(2) CONSIDERATIONS.—In carrying out paragraph (1), the Under Secretary may consider the following:

(A) Partnering or contracting with entities that have participated in the testbed described in subsection (c)(2)(D), the National Mesonet

Program, or Cooperative Research and Development Agreements.

(B) Weather camera systems and services, including in consultation with the Federal Aviation Administration, as viable technologies to supplement weather forecasting and prediction needs.

(e) UPDATES TO CONGRESS.—The Under Secretary shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate periodic updates on the implementation of this section.

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

(a) IN GENERAL.—The Under Secretary, in coordination with the Director of the National Weather Service and the Administrator of the Federal Emergency Management Agency, in consultation with the United States weather industry, academic partners, and in accordance with activities implemented through existing regional atmospheric, coastal, ocean, and Great Lakes observing systems, shall carry out activities to ensure equitable and comprehensive weather observation coverage, impact-

based decision support services, and emergency information sharing in the United States, including the following:

(1) Identifying regions in the United States and the territories of the United States that are underobserved or highly vulnerable to weather impacts that threaten human life, health, and the economy.

(2) Identifying any challenges that contribute to the lack of operations under paragraph (1).

(3) Increasing weather observations and developing new weather observational capabilities, such as urban heat island mapping campaigns, with respect to the regions identified under paragraph (1).

(4) Establishing or supporting testbeds and deployments of decision-support services to Federal, State, and local emergency operations centers to develop and integrate new weather, water, and climate observation or emergency information sharing tools, with respect to the regions identified under paragraph (1).

(5) To the maximum extent practicable, advancing weather and water forecasting and climate modeling capabilities for the regions identified under paragraph (1).

(6) Undertaking workforce development efforts for emergency management officials and meteorologists in the regions identified under paragraph (1).

(7) Using data-void-filling observations to better resolve extreme rainfall in complex topography.

(8) Contributing to a national integrated heat health information system.

(b) INTERAGENCY PARTNERSHIP TO SUPPORT PILOT PROJECTS.—In carrying out this section, the Under Secretary, acting through the Director of the National Weather Service and in collaboration with the Administrator of the Federal Emergency Management Agency, shall establish an interagency partnership to support pilot projects that accelerate coordination and use of localized weather, water, and climate data and impact-based communications in infrastructure and emergency management decisions by Federal, State, and local officials.

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

SEC. 204. ATMOSPHERIC RIVERS FORECAST IMPROVEMENT PROGRAM.

(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and academic partners and in coordination with the precipitation forecast improvement program under section 603 of the Weather Research and Forecasting Innovation Act of 2017, as added by section 115 of this Act, shall establish an atmospheric river forecast improvement program (in this section referred to as the ''program'').

(b) GOAL.—The goal of the program shall be to reduce the loss of life and property and economic losses from atmospheric rivers through the research, development, and extension of accurate, effective, and actionable forecasts and warnings, including by carrying out the following:

(1) Establishing atmospheric river forecast skill metrics that include assessing the benefits of dynamical modeling, data assimilation, and machine learning improvements in the probabilistic forecasts of landfall location, extreme wind and precipitation, and cascading impacts.

(2) Developing an atmospheric river forecast system within a unified forecast system, and advancing next-generation coupled modeling systems, with the capability of providing seasonal to short-range atmospheric river forecasts that include forecast of

snow accumulation and other hydrologic components.

(3) Advancing scientific understanding of the roles of atmospheric rivers in subseasonal to seasonal precipitation and probabilistic predictions at subseasonal and seasonal scales.

(4) Developing tools and improved forecast products to predict periods of active or inactive atmospheric river landfalls and inland penetration over the United States with a focus on addressing stakeholder and public needs related to perceiving, comprehending, and responding to atmospheric river forecast improvements.

(5) Enhancing the transition of research to operations through the National Oceanic and Atmospheric Administration's testbeds, including the evaluation of physical and social science, technology, and other research to develop products and services for implementation and use by relevant stakeholders.

(6) Incorporating into atmospheric river modeling and forecasting, as appropriate, social, behavioral, risk, communication, and economic sciences.

(c) INNOVATIVE OBSERVATIONS, DATA ASSIMILATION, AND MODELING.—The Under Secretary shall ensure the program periodically examines, tests, and evalu-

ates the value of incorporating innovative observations, data, and measurements with respect to the improvement of atmospheric river analysis, modeling, forecasts, predictions, and warnings.

(d) PROGRAM PLAN.—Not later than 270 days after the date of the enactment of this Act, the Under Secretary, in consultation with the Secretary of the Air Force or the Commander of the 53rd Weather Reconnaissance Squadron of the Air Force Reserve Command, shall develop a plan that details the specific research, development, data acquisition, partnerships with the weather industry and academic partners, and technology transfer activities, as well as corresponding resources, and timelines, necessary to achieve the goal of the program under subsection (b). Such plan shall be made available to the public on release.

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

(f) IMPROVED MODELING.—In carrying out the program, the Under Secretary may carry out the following:

(1) Develop, test, and operationalize prototype high-resolution Atmospheric River Analysis and

Forecasting System models through research and operations partnerships with institutions of higher education and other partners outside the National Oceanic and Atmospheric Administration.

(2) Enhance data assimilation of current and new satellite and ocean observations that is useful for atmospheric river analysis and forecasting predictions.

(3) Improve data processing techniques related to atmospheric river analysis and forecasting predictions.

(4) Use artificial intelligence and machine learning methods as applicable to atmospheric river analysis and forecasting predictions.

(5) Ensure the surface and subsurface observations of the ocean meet the needs of atmospheric river analysis and forecasting predictions on different time scales.

(6) To the maximum extent practicable, improve or establish baseline weather monitoring services in areas that have historically experienced, or are predicted to experience, atmospheric rivers.

(g) CONDUCT OF RECONNAISSANCE.—The Under Secretary shall acquire and sustain adequate aircraft, scientific equipment, and personnel to meet mission require-

ments of the National Hurricane Operations Plan and the National Winter Seasons Operation plan, and to carry out the following:

(1) Ensure atmospheric river air reconnaissance observations are available throughout the expected seasons of tropical cyclones and atmospheric rivers.

(2) To the maximum extent practicable and in accordance with paragraph (4), ensure data and information collected are made available for research and operations purposes.

(3) Participate in research and operations partnerships that guide flight planning and use research methods to improve and expand the capabilities and effectiveness of atmospheric river reconnaissance over time.

(4) Develop data management strategies to ensure that data and metadata are adequately stewarded, maintained, and archived.

(5) Undertake such other additional activities as the Under Secretary, in consultation with the Secretary of the Air Force, considers appropriate to improve and grow the hurricane hunter and atmospheric river reconnaissance mission.

(h) IMPROVED ATMOSPHERIC RIVER HAZARD COMMUNICATION.—The Under Secretary may conduct re-

search and development activities in coordination with the program established under section 403(a) to carry out the following:

(1) As appropriate, develop and refine methods to categorize the intensity of weather and oceans hazards, including tropical cyclones and atmospheric rivers, on a quantitative scale and the effectiveness of such scale in hazard communication.

(2) Develop best practices for communication of atmospheric river events and hazards across regions of the United States.

(3) Gather information from areas prone to hurricanes and atmospheric rivers regarding levels of knowledge and preparedness, including responses to early forecasts and warnings by the National Oceanic and Atmospheric Administration.

(4) Explore strategies and effectiveness of communicating that hurricane and atmospheric river events are beneficial at lower intensities versus hazardous at higher intensities.

SEC. 205. COASTAL FLOODING AND STORM SURGE FORECAST IMPROVEMENT PROGRAM.

(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and academic partners, shall establish a coastal flooding and

storm surge forecast improvement program (in this section referred to as the ''program'').

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

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

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

(2) Improving the capacity to mitigate, adapt to, or prevent the impacts of coastal flooding, including high tide flooding, and storm surge events, including by improving the understanding and capacity of coastal communities to perceive, comprehend, and respond to forecast information.

(3) Incorporating data from in situ distributed sensors into predictive models and re-analyses.

(4) Developing probabilistic coastal flooding, including high tide flooding, and storm surge estimates to complement worst-case scenario estimates,

including for use in long-term planning and risk management by States, Tribal governments, localities, and emergency managers in coordination with the Federal Emergency Management Agency, as appropriate.

(5) Establishing skill metrics for coastal inundation forecasting that quantify the benefits of dynamical modeling, data assimilation, and machine learning improvements in the probabilistic forecast of coastal flooding, including high tide flooding, and storm surge risk and impacts.

(6) Improving operational regional storm surge models and, in collaboration with the United States Geological Survey, wave prediction models to enhance probabilistic guidance and messaging.

(d) INNOVATIVE OBSERVATIONS AND MODELING.—The Under Secretary shall ensure the program periodically examines, tests, and evaluates the value of incorporating enhanced model physics, hybrid dynamical or machine learning based prediction systems, and innovative observations, such as novel sensor technologies, observation networks, crewed or uncrewed systems, and hosted instruments on commercial aircrafts, vessels, and satellites, with respect to the improvement of coastal flooding, including

high tide flooding, and storm surge forecasts, predictions, and warnings.

(e) PROGRAM PLAN.—Not later than 180 days after the date of the enactment of this Act, the Under Secretary shall develop a plan that details the specific research, development, data acquisition, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the goal of the program under subsection (b).

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

SEC. 206. AVIATION WEATHER AND DATA INNOVATION.

(a) PROGRAM.—The Under Secretary shall maintain an airborne observation program (in this section referred to as the ''program'') for the acquisition of atmospheric sensor data and the deployment of critical atmospheric sensors, including in partnership with the weather enterprise.

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

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

(2) Acquisition of additional vertical profile observations that provide spatial and temporal density, as determined by the Under Secretary.

(3) Analysis of procured data when incorporated into the National Oceanic and Atmospheric Administration's unified forecast system in order to provide improved forecast information for aircraft.

(c) BUDGET.—The Under Secretary shall, not less frequently than annually, submit to Congress a proposed budget corresponding with the activities described in subsection (b), including an analysis of activities that can be complemented by National Oceanic and Atmospheric Administration aircraft.

(d) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized to be appropriated for the Commercial Data Program under section 302 of the Weather Research and Forecasting Innovation Act of 2017, there shall be available not more than $10,000,000 for each of fiscal years 2026 through 2030 to carry out the program.

(e) AVIATION WEATHER AND TURBULENCE FORECASTING.—The Director of the National Weather Service shall include turbulence events, icing conditions, or other

phenomena in the forecasting capabilities of the Aviation Weather Center and the Center Weather Service Units, and deliver operational forecasts with consistent, timely, and accurate weather and turbulence information for the airspace system and the protection of lives and property.

(f) COORDINATION.—In carrying out subsection (e), the Director of the National Weather Service shall give consideration to recommendations from the Administrator of the Federal Aviation Administration in furtherance of section 44720 of title 49, United States Code, and improve weather and turbulence forecasting capabilities by carrying out the following:

(1) Designating or establishing within the Federal Government an interagency working group to determine weather and environmental data or observation requirements, needs, and potential solutions related to aviation weather and turbulence modeling or forecasting.

(2) Identifying current and future potential data gaps related to turbulence events or phenomena that can—

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

(B) be supplemented or filled by commercial aviation tools.

(3) Transitioning research initiatives and pilot programs, including a pilot program of instrumentation for observing greenhouse gases and other atmospheric factors deployed on commercial aircraft and support for the evaluation of a sustained observing network using such instrumentation, into operations that improve the forecasting capabilities of the Aviation Weather Center.

(4) Developing and deploying improved probabilistic aviation weather forecast guidance technology.

(5) Updating interagency agreements as appropriate, including to address reimbursable agreements.

(g) NEXT GENERATION AVIATION RESEARCH.—Paragraph (3) of section 102(b) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8512(b)), as amended by section 111(a), is further amended by—

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

(2) inserting after subparagraph (E) the following new subparagraph:

"(F) aviation weather phenomena, including atmospheric composition and turbulence, to

improve scientific understanding and forecast capabilities for the airspace system;''.

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

(i) PROVISION OF WEATHER SERVICES TO THE FEDERAL AVIATION ADMINISTRATION.—

(1) SENSE OF CONGRESS.—It is the sense of Congress that the aviation weather services provided to the Federal Aviation Administration by the National Oceanic and Atmospheric Administration are critical to the functions of the Federal Aviation Administration and the safety of the flying public.

(2) INTERAGENCY AGREEMENT.—The Under Secretary and the Administrator of the Federal Aviation Administration shall enter into or otherwise participate in an interagency agreement for a period of not less than five years under which the National Oceanic and Atmospheric Administration provides weather services to the Federal Aviation Administration.

(3) BRIEFINGS.—Not less frequently than once per quarter through 2030, the Under Secretary and the Administrator of the Federal Aviation Administration shall provide a briefing to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on the status of the provision by the National Oceanic and Atmospheric Administration of weather services to the Federal Aviation Administration and the interagency agreement under paragraph (2).

SEC. 207. NESDIS PARTNERSHIP PROGRAM, TRANSITION PROGRAM, AND OPERATIONAL PLANNING.

(a) PARTNERSHIP PROGRAM.—

(1) IN GENERAL.—The Assistant Administrator of the National Environmental Satellite, Data, and Information Service (in this section referred to as the ''Assistant Administrator'') shall maintain a partnership program to enhance engagement with the private sector, academia, and other Federal departments and agencies (in this section referred to as the ''partnership program'').

(2) ADMINISTRATION.—The Assistant Administrator, in consultation with the Administrator of the National Aeronautics and Space Administration,

shall administer broad agency announcements and other transactional authority or contracting mechanisms, on an annual or more frequent basis, to support the partnership program.

(b) TRANSITION PROGRAM.—

(1) IN GENERAL.—To support the development of next-generation technologies, missions, data systems, spacecraft, and instrument design, the Assistant Administrator, in consultation with the Administrator of the National Aeronautics and Space Administration, shall maintain a program to transition selected awards from research and study phases into demonstration (in this section referred to as the ''transition program'').

(2) CONSIDERATIONS.—In selecting awardees for demonstrations under the transition program, the Assistant Administrator shall consider technologies, missions, data systems, spacecraft, and instrument design that accomplish the following:

(A) Improve upon the National Oceanic and Atmospheric Administration's satellite architecture.

(B) Have a direct impact on implementing the recommendations of the Administration's 2018 Satellite Observing System Architecture

Study entitled, ''Building a Plan for NOAA's 21st Century Satellite Observing System''.

(C) Meet current or future mission requirements.

(c) OPERATIONAL PLANNING.—In carrying out the transition program, the Assistant Administrator shall monitor demonstration phase progress and plan for promising results that meet mission requirements to be transitioned into the operational satellite architecture of the National Oceanic and Atmospheric Administration.

(d) ANNUAL PLAN.—Not less frequently than annually until 2030, the Assistant Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an annual plan that outlines the progress made in the partnership program under subsection (a), the transition program under section (b), and operational planning under subsection (c).

(e) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized to be appropriated to the National Environmental Satellite, Data, and Information Service, there shall be available $20,000,000 for fiscal years 2026 through 2030 to carry out to this section.

SEC. 208. ADVANCED WEATHER INTERACTIVE PROCESSING SYSTEM.

(a) IN GENERAL.—Not later than September 30, 2030, the Under Secretary, acting through the Director of the National Weather Service, shall develop a strategy to transition operations of the Advanced Weather Interactive Processing System to an operational cloud-based environment in order to enable a more nimble, flexible, and mobile workforce.

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

(1) Integrating and displaying forecast data, including meteorological, hydrological, climate, ocean, satellite, and radar data, for National Weather Service field offices and national centers.

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

(3) Providing an interactive communications system, including any relevant capabilities of the existing satellite broadcast network, to connect relevant National Weather Service employees and sites.

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

(c) ELEMENTS.—The transition of operations required under subsection (a) may include the following:

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

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

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

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

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

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

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

(8) Development, testing, demonstration, evaluation, and operationalization of forecast and warning products, consistent with the mission and scientific expertise of the National Oceanic and Atmospheric Administration.

(d) UPDATES TO CONGRESS.—The Under Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate periodic updates on the implementation of this section.

(e) CONTINUED INNOVATION.—Nothing in this section may be construed as prohibiting the development of new forecast capabilities, subsystems, or implementing modeling advancements on the operational computing systems of the National Oceanic and Atmospheric Administration.

SEC. 209. REANALYSIS AND REFORECASTING.

The Under Secretary may support reanalysis and reforecasting activities within the National Oceanic and Atmospheric Administration, including through weather testbeds of the Administration, for the following:

(1) Improving weather forecasts, extreme weather predictions, and weather and climate datasets.

(2) Serving as training data for artificial intelligence and machine learning data-driven models.

SEC. 210. NATIONAL WEATHER SERVICE WORKFORCE.

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

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

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

(b) HEALTH AND MORALE ASSESSMENT.—The Director of the National Weather Service shall contract or continue to partner with an external entity or organization to conduct an assessment of medical impacts, including

stress and long-term health impacts, on National Weather Service employees related to required rotating shift work. Such assessment may include options for mitigating such impacts on employees and recommendations for improving benefits related to required rotating shift work.

(c) ROLE OF THE DIRECTOR.—Notwithstanding the results of the assessment under subsection (b), the Director of the National Weather Service shall establish service level standards based on staffing levels.

(d) DESIGNATION OF SERVICE HYDROLOGIST.—

(1) IN GENERAL.—The Director of the National Weather Service may designate at least one service coordination hydrologist at each Weather Forecast Office of the National Weather Service.

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

(3) PERFORMANCE BY OTHER EMPLOYEES.—Notwithstanding paragraphs (4) and (5), the Director of the National Weather Service may assign the performance of the responsibilities described in this subsection to such other staff of the National

Weather Service as the Director considers appropriate.

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

(A) Be responsible for providing service to the geographic area of responsibility covered by the Weather Forecast Office at which the service coordination hydrologist is employed to help ensure that users of products and services of the National Weather Service can respond effectively to improve outcomes from flood events.

(B) Liaise with users of products and services of the National Oceanic and Atmospheric Administration, such as emergency managers, the public, academia, media outlets, users in the hydropower, transportation, recreation, and agricultural communities, and forestry, land, fisheries, and water management interests, to evaluate the adequacy and usefulness of the products and services referred to in subparagraph (A), including extended range streamflow forecasts, water supply forecasts, drought out-

looks, flood inundation mapping, coastal inundation, and flood warnings.

(C) Collaborate with the National Water Center, River Forecast Centers, other Weather Forecast Offices, the National Integrated Drought Information System, Administration offices, and Federal, State, local, and Tribal government agencies, as the Director considers appropriate, in developing, proposing, and implementing plans to develop, modify, or tailor such products and services to improve the usefulness of such products and services.

(D) Engage in interagency partnerships with Federal, State, local, and Tribal government agencies to explore the use of forecast-informed reservoir operations to reduce flood risk and inform decisions related to water resources management.

(E) Ensure the maintenance and accuracy of flooding and water resource management partner call lists, appropriate office hydrologic service policy or procedures, and other hydrologic information or dissemination methodologies or strategies.

(F) Work closely with Federal, State, local, and Tribal emergency and floodplain management agencies, and other agencies relating to disaster management, to ensure a planned, coordinated, and effective preparedness and response effort.

(5) ADDITIONAL RESPONSIBILITIES.—A service coordination hydrologist designated under this subsection may, with respect to hydrology, carry out the following:

(A) Work with a State agency to develop plans for promoting more effective use of products and services of the National Weather Service throughout the State concerned.

(B) Identify priority community preparedness objectives.

(C) Develop plans to carry out the responsibilities described in paragraph (4).

(D) Conduct flooding event preparedness planning and citizen education efforts with and through various State, local, and Tribal government agencies and other disaster management-related organizations.

(e) PILOT PROJECTS.—

(1) IN GENERAL.—The Director of the National Weather Service shall carry out the following:

(A) Perform pilot projects for transformational services related to decision support services and technology, transitioning data and services to the cloud, provision of on-site decision support for emergency management operations, and transition to and communication of probabilistic models, forecasts, and hazard information.

(B) Conduct a study to assess the capabilities needed to scale such pilot projects toward a new, more efficient and effective operations model.

(2) SUNSET.—The authority under paragraph (1) shall terminate two years after the date of the enactment of this Act.

SEC. 211. ARTIFICIAL INTELLIGENCE FOR WEATHER FORECASTING.

(a) DEFINITIONS.—In this section:

(1) ARTIFICIAL INTELLIGENCE.—The term ''artificial intelligence''—

(A) has the meaning given that term in section 5002 of the National Artificial Intel-

ligence Initiative Act of 2020 (15 U.S.C. 9401); and

(B) includes machine learning, neural networks, and natural language processing.

(2) ARTIFICIAL INTELLIGENCE WEATHER MODEL.—The term ''artificial intelligence weather model'' means a weather model based primarily on artificial intelligence technology to project future Earth system conditions based on machine learning using weather forecasting training datasets.

(3) CURATE.—The term ''curate'', with respect to a dataset, means the following:

(A) To collect and maintain the dataset to accomplish the following:

(i) Ensure and document its quality.

(ii) Provide metadata on its provenance.

(B) To update the dataset periodically, as appropriate and practicable.

(4) NUMERICAL WEATHER MODEL.—The term ''numerical weather model'' means a weather model based primarily on coupled Earth system processes that uses numerical computation to forecast future Earth system conditions.

(5) OBSERVATIONAL DATA.—The term ''observational data'' means data and metadata from actual observations of environmental conditions, including remote sensing and in situ platforms.

(6) SYNTHETIC DATA.—The term ''synthetic data'' means data produced from a model or statistical method in order to fill gaps in observational data.

(7) WEATHER FORECASTING TRAINING DATASET.—The term ''weather forecasting training dataset''—

(A) means a dataset that contains continuous global observational data and synthetic data for Earth system variables relevant to weather forecasting, aviation weather, marine weather, and hydrology and water management; and

(B) may include model reanalysis and forecasts initialized through a data assimilation system.

(b) PURPOSE.—The purpose of this section is to carry out the following:

(1) Improve accuracy and timeliness of weather, water, and space weather forecasts and effective dissemination of critical information.

(2) Strengthen analytic capacity to inform resource deployments in response to and to mitigate harm from weather, water, and space weather hazards through the mandated exploration and use of artificial intelligence by Federal agencies.

(3) Strengthen public-private partnerships to accelerate adoption and outcomes of the use of artificial intelligence in response to and to mitigate such harm.

(4) Strengthen public-private partnerships in highly technical, high-risk, and high-reward fields related to weather, water, and space weather forecasts.

(c) EARTH SYSTEM FORECASTING AND INFORMATION DELIVERY.—

(1) TRAINING DATASETS.—Not later than four years after the date of the enactment of this Act, the Under Secretary, in consultation with the Secretary of Energy, the Administrator of the National Aeronautics and Space Administration, the Director of the National Science Foundation, the Director of the National Center for Atmospheric Research, the Interagency Council on Advancing Meteorological Services, other appropriate Federal advisory committees as determined by the Under Secretary, and such other technical experts as the Under Secretary con-

siders appropriate, shall develop and curate comprehensive weather forecasting training datasets with relevant Earth system data, quality information, and metadata necessary for weather forecasting.

(2) USE OF EXISTING DATASETS.—In order to speed the development of the weather forecasting training datasets required under paragraph (1), the Under Secretary shall assess, and to the greatest extent practicable build on, existing Earth system reanalysis datasets of the Federal Government.

(3) ARTIFICIAL INTELLIGENCE WEATHER MODEL.—

(A) GLOBAL MODEL.—In carrying out this subsection, the Under Secretary, in consultation with appropriate Federal advisory committees as determined by the Under Secretary, may develop and test a global weather model based on artificial intelligence technologies utilizing data of the National Oceanic and Atmospheric Administration to the extent possible.

(B) REGIONAL AND LOCAL MODELS.—In addition to a global weather model under subparagraph (A), the Under Secretary may exper-

iment with regional and local weather models based on artificial intelligence technologies.

(4) USE OF ARTIFICIAL INTELLIGENCE TO DISSEMINATE INFORMATION.—In coordination with an artificial intelligence weather model or models developed under paragraph (3), the Under Secretary may explore the use of artificial intelligence to enhance the dissemination of information with respect to weather and evaluate the effectiveness of communication for improved public understanding and preparedness.

(5) CONTINUED SUPPORT FOR OBSERVATIONS, BASIC RESEARCH, AND NUMERICAL WEATHER MODELS.—Notwithstanding the requirements of this subsection, the Under Secretary shall continue to support and advance the activities of the National Oceanic and Atmospheric Administration to carry out the following:

(A) Collect and acquire traditional and novel observational data relevant for artificial intelligence and numerical weather, water, and space weather forecasting.

(B) Advance research on the Earth system and numerical weather model forecasting.

(C) Develop and advance numerical Earth system modeling for predictions.

(D) Develop weather model data post-processing techniques.

(E) Improve data assimilation techniques.

(6) OBSERVING SYSTEM COVERAGE.—In carrying out this subsection, the Under Secretary may evaluate the use of cost functions in data-driven machine learning model training to balance inequities in observing system coverage and data poor areas.

(7) UNCERTAINTY QUANTIFICATION RESEARCH.—In carrying out this subsection, the Under Secretary may develop uncertainty quantification research for the purpose of accurate environmental risk and hazard communications of probabilistic predictions and forecasts.

(8) REPORT.—Not later than two years after the date of the enactment of this Act and not less frequently than every two years thereafter through 2035, the Under Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report on the activities conducted under this subsection.

(d) ADVANCED ARTIFICIAL INTELLIGENCE APPLICATIONS FOR WEATHER AND INFORMATION DELIVERY.—The Under Secretary shall explore advanced applications of artificial intelligence to improve weather forecasts and information delivery, such as by carrying out the following:

(1) Improving data assimilation.

(2) Accounting for coupled Earth system processes.

(3) Using artificial intelligence weather models to generate ensemble forecasts to more accurately assess flow-dependent forecast uncertainties.

(4) Improving impact-based decision support to diverse users and communities for greater societal benefits based on those forecasts.

(e) TECHNICAL ASSISTANCE ON USE OF ARTIFICIAL INTELLIGENCE WEATHER, WATER, AND SPACE WEATHER MODELS.—

(1) IN GENERAL.—The Under Secretary shall provide the following:

(A) Technical assistance, data access, and support for forecasters, scientists, social scientists, and engineers to test and evaluate the use and effectiveness of the artificial intelligence models of the National Oceanic and At-

mospheric Administration, including within the testbeds of the Administration.

(B) Best practices on providing forecasts based on outputs from artificial intelligence weather models and numerical weather models, or a combination thereof.

(C) Support for emergency managers to make operational decisions based on outputs from artificial intelligence weather models and numerical weather models, or a combination thereof.

(2) ASSESSMENT OF WEATHER MODELS.—

(A) IN GENERAL.—The Under Secretary shall support the development of a common framework for the assessment of numerical weather models and artificial intelligence weather models by comparing model output and observational data over a period of time in the past through the use of such methodologies as the Under Secretary considers appropriate.

(B) BEST PRACTICES.—In carrying out this paragraph, the Under Secretary may develop and disseminate best practices in collaboration with the following;

(i) The National Institute of Standards and Technology, the National Aeronautics and Space Administration, the National Science Foundation, and the Department of Energy.

(ii) Academic and research institutions.

(iii) The private sector.

(3) TECHNICAL ASSISTANCE.—In carrying out this subsection, the Under Secretary may provide technical assistance, best practices, and support required under paragraph (1) through the National Weather Service.

(4) INDEPENDENT STUDY ON THE IMPACTS OF ARTIFICIAL INTELLIGENCE WEATHER, WATER, AND SPACE WEATHER MODELS.—The Under Secretary may enter into an agreement with the National Academy of Sciences or another entity as determined appropriate by the Under Secretary to assess the impacts of artificial intelligence weather models on the weather enterprise and make recommendations to improve the integration of such models in operational forecasting.

(f) PARTNERSHIPS FOR TRANSFORMATIONAL INNOVATION.—

(1) IN GENERAL.—The Under Secretary may explore novel structures for partnerships with private, academic, and international entities for research and development of transformative innovation in weather forecasting and other environmental forecasts to accomplish the following:

(A) Further the understanding of weather, water, and space weather, and their societal impact.

(B) Advance the science of weather and water forecasting, including seasonal and subseasonal forecasting.

(C) Develop, evaluate, and transition artificial intelligence weather, water, and hazard forecasting applications to operations.

(2) CO-INVESTMENT.—Subject to applicable law, the Under Secretary may consider and adopt novel co-investment strategies with the private academic and international sectors to carry out paragraph (1), including the following:

(A) Non-Federal Government contributions to resource and support high-risk, high-return research and development in environmental forecasting, data science, artificial intelligence, and related fields.

(B) Shared rights to intellectual property from research and development activities under this subsection.

(C) Other approaches to sharing resources and results under this subsection.

(g) AVAILABILITY OF DATASET.—

(1) IN GENERAL.—The Under Secretary shall develop and implement a plan to make available to the public, at no cost and subject to applicable law and policy, the following:

(A) Operational artificial intelligence weather models developed by the National Oceanic and Atmospheric Administration.

(B) Artificial intelligence weather models that are not operational models, including experimental and developmental models, as the Under Secretary determines appropriate.

(C) Applicable information and documentation for artificial intelligence weather models described in subparagraphs (A) and (B), including a description of intended model outputs.

(D) Subject to subsection (i), all data owned by the Federal Government and data that the Under Secretary has the legal right to redistribute that are associated with artificial

intelligence weather models made available to the public pursuant to the plan and used in operational forecasting by the Administration, including the following:

(i) Relevant metadata.

(ii) Data used for operational artificial intelligence weather models used by the Administration.

(2) ACCOMMODATIONS.—In developing and implementing the plan under paragraph (1), the Under Secretary may make such accommodations as the Under Secretary considers appropriate to ensure that the public release of any artificial intelligence weather model, information, documentation, or data pursuant to the plan does not jeopardize the following:

(A) National security.

(B) Intellectual property or redistribution rights, including under titles 17 and 35, United States Code.

(C) Any trade secret or commercial or financial information subject to section 552(b)(4) of title 5, United States Code.

(D) Any models or data that are otherwise restricted by contract or other written agreement.

(E) The mission of the Administration to protect lives and property.

(3) REPORT.—

(A) IN GENERAL.—Not later than one year after the date of the enactment of this Act, the Under Secretary shall submit to Congress a report, in both unclassified and classified form, regarding the risks to the economic and intellectual security of the United States from foreign countries of concern through access by such countries to weather data in the United States.

(B) ELEMENTS.—The report required under subparagraph (A) shall include the following:

(i) A full analysis of the national, intellectual, and economic security implications for the United States with respect to intellectual property theft or cyber or human espionage through access to weather data.

(ii) Conclusions of the Under Secretary and recommendations for legislative and administrative action, if any.

(C) FOREIGN COUNTRY OF CONCERN DEFINED.—In this paragraph, the term ''foreign country of concern'' has the meaning given that term in section 9901 of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (15 U.S.C. 4651).

(h) RETENTION OF FEDERAL GOVERNMENT EXPERTISE.—Subject to applicable law, the Under Secretary may consider novel methods to recruit, retrain, and retain expert personnel to support activities under this section, including by carrying out the following:

(1) Using methods to be competitive with salaries outside the Federal Government.

(2) Developing staff exchange programs and training programs.

(3) Leveraging diverse hiring strategies.

(i) PROTECTION OF NATIONAL SECURITY INTERESTS.—

(1) IN GENERAL.—Notwithstanding any other provision of this section, the Under Secretary, in consultation with the Secretary of Defense, as appropriate, may withhold models or data used under

this section if the Under Secretary determines doing so to be necessary to protect the national security interests of the United States.

(2) RULE OF CONSTRUCTION.—Nothing in this section may be construed to supersede any other provision of law governing the protection of the national security interests of the United States.

SEC. 212. COMPOSITION OF THE ATMOSPHERE AND ATMOSPHERIC OBSERVATIONS.

(a) ASSESSMENTS.—Not later than two years after the date of the enactment of this Act, the Under Secretary shall submit to the appropriate committees of Congress a report that includes the following:

(1) An identification of Federal observation capabilities and data gaps related to the composition of Earth's atmosphere, including the troposphere and stratosphere.

(2) An analysis of Federal efforts that advance scientific understanding of the effects on the Earth's radiation budget of direct or indirect actions that may change the composition of Earth's atmosphere.

(3) The current and projected use of ground-based, space-based, and maritime-based remote and in situ sensing capabilities, autonomous and manned aerial platforms, and other commercially available

technologies and platforms of opportunity to accelerate research and increase observations and monitoring of Earth's atmosphere.

(4) Recommendations for the adaptation or expansion of technologies and platforms identified under paragraph (3).

(5) An identification and prioritization of additional observation and analysis capabilities needed to ensure comprehensive monitoring that detects future changes in atmospheric composition.

(b) CONSIDERATIONS.—In preparing an assessment required under subsection (a), the Under Secretary shall consider and use, as appropriate, reports and studies conducted by Federal agencies, the National Research Council, or other entities.

(c) PILOT PROJECTS.—

(1) PILOT PROJECTS.—The Under Secretary may conduct pilot projects of atmospheric composition observational systems and platforms, including the following:

(A) The use of atmospheric observing instruments on commercial and uncrewed aircraft.

(B) The use of atmospheric and oceanic observing instruments on uncrewed ocean sur-

face platforms or deployed on commercial or other nondedicated ocean vessels.

(C) In-situ observation capability to conduct regular atmospheric observations of the troposphere and stratosphere.

(2) CONSULTATION AND COORDINATION.—The Under Secretary shall consult and coordinate with relevant Federal agencies to develop processes for the appropriate deployment of systems and platforms pursuant to pilot projects required under paragraph (1).

(d) AUTHORITY TO ENTER INTO AGREEMENTS.—Notwithstanding any other provision of law, the Under Secretary may enter into agreements, to the extent necessary to carry out this section, with governmental and nongovernmental entities for the following purposes:

(1) Purchase of atmospheric composition data from commercial providers,

(2) Hosting of observational instruments on government or private platforms, and

(3) Leveraging data from international platforms, as appropriate.

(e) DEFINITION OF APPROPRIATE COMMITTEES OF CONGRESS.—In this section, the term ''appropriate committees of Congress'' means—

(1) the Committee on Commerce, Science, and Transportation of the Senate; and

(2) the Committee on Science, Space, and Technology of the House of Representatives.

SEC. 213. PROJECT TO IMPROVE FORECASTS OF COASTAL MARINE FOG.

(a) IN GENERAL.—The Under Secretary shall conduct a project to improve forecasts of coastal marine fog.

(b) GOAL.—The goal of the project under subsection (a) is to enhance vessel safety and reduce the economic impact of coastal marine fog events, with a focus on the following:

(1) Increasing the number of marine-based observations through additional Federal platforms and commercially acquired observations in locations where impacts from marine fog and reduced visibility have major safety and economic impacts, including through the use of the following:

(A) Buoys.

(B) Meteorological stations measuring visibility, temperature, dewpoint, and wind speed and direction as a stand-alone or co-located with water level sensors, such as those that are part of the physical oceanographic observation

system program of the National Oceanic and Atmospheric Administration.

(C) Stationary platforms or drifting instruments.

(D) Vessels.

(E) Unmanned systems.

(F) Remote sensing technologies, including rapid refresh hyperspectral satellite imagery.

(G) Advanced algorithms that extract actionable information from observational data, including early detection and regular monitoring of marine fog.

(2) Advancing geographic coverage, resolution, skill, and accuracy of marine fog modeling, including, when feasible, additional locations and advancements in marine channel forecast capability.

(3) Improving communication of marine fog advisories by the National Oceanic and Atmospheric Administration.

(4) Communicating risks posed by hazardous marine fog events in a way that maximizes informed decisionmaking by the public.

(5) Providing decision support services based on environmental information that is actionable to the recipient of a marine fog advisory.

(c) STAKEHOLDER ENGAGEMENT.—In implementing the project under subsection (a), the Under Secretary shall meet with public and private stakeholders regarding the planning, development, and implementation of the project.

(d) TRIBAL ENGAGEMENT.—The Under Secretary shall meet with Indian tribes (as such term is defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304)) regarding the planning, development, and implementation of the project required under subsection (a).

(e) PROJECT PLAN.—Not later than one year after the date of the enactment of this Act, the Under Secretary shall develop a plan for the project required subsection (a) that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the goal specified in subsection (b).

TITLE III—COMMERCIAL WEATHER AND ENVIRONMENTAL OBSERVATIONS

SEC. 301. COMMERCIAL DATA PROGRAM.

The Weather Research and Forecasting Innovation Act of 2017 is amended by amending section 302 (15 U.S.C. 8532) to read as follows:

"SEC. 302. COMMERCIAL DATA PROGRAM.

''(a) PROGRAM ESTABLISHMENT.—The Under Secretary, in coordination with the heads of appropriate offices of the National Oceanic and Atmospheric Administration, shall maintain a Commercial Data Program to coordinate and execute acquisition of weather and environmental data and services from private sector entities for operational use.

''(b) PROGRAM ELEMENTS.—The Under Secretary may acquire satellite, ground-based, airborne, or marine-based in situ, remote sensing, or crowd-sourced data and services for operational use relating to weather and environmental forecasting and modeling.

''(c) COORDINATION AND COLLABORATION.—The Under Secretary shall ensure the Commercial Data Program coordinates, collaborates, and ensures access to data across the Administration, including among the following:

''(1) The National Mesonet Program.

''(2) The Aircraft-Based Observation Program.

''(3) The National Integrated Drought Information System, including the National Coordinated Soil Moisture Monitoring Network.

''(4) The National Integrated Flood Information System.

''(5) The Global Ocean Monitoring and Observing Program.

''(6) The National Data Buoy Center.

''(7) The Uncrewed Systems Operation Center.

''(8) The Ocean Exploration Program.

''(9) Any other program or office the Under Secretary determines appropriate.

''(d) STANDARDS AND SPECIFICATIONS.—Not later than 180 days after the date of the enactment of this section and on a continuous basis thereafter, the Under Secretary shall publish data, metadata, and service standards and specifications required for acquired observation services and data for use, licensing, and attribution to ensure quality, impact, and compatibility of such services and data with National Oceanic and Atmospheric Administration modeling capabilities, meteorological situational awareness, and forecasting.

''(e) PRIORITIZATION.—In acquiring data and services from private sector entities, the Under Secretary shall prioritize obtaining surface-based, airborne-based, space-based, and coastal- and ocean-based data, metadata, and services for operational use from entities that participate in the Commercial Data Pilot Program or other programs of the National Oceanic and Atmospheric Administration that acquire commercial data or observations.

''(f) NOAA OBSERVING SYSTEMS COUNCIL AND FLEET COUNCIL.—

''(1) IN GENERAL.—The Under Secretary shall maintain the National Oceanic and Atmospheric Administration Observing Systems Council and the NOAA Fleet Council (in this subsection referred to as the 'Councils') to provide strategic recommendations and guidance regarding the prioritization, design, development, acquisition, upgrading, lifecycle, performance monitoring, and retiring of major components of observing systems and portfolios, including related to the acquisition of commercial weather and environmental data and services.

''(2) LINE OFFICE COORDINATION.—The Councils shall ensure coordination and adherence to uniform policies by providing guidance to all line offices of the National Oceanic and Atmospheric Administration engaged in observing systems portfolio design, technology, development, execution, and operation.

''(3) COMMITTEE.—The Under Secretary shall maintain a Committee within the Councils to develop and approve procedural directives, guides, or handbooks relevant to management of data and information, including commercial data, and coordinate data governance and management practices across the

National Oceanic and Atmospheric Administration to promote consistent processes.

''(g) AUTHORIZATION OF APPROPRIATIONS.—

''(1) IN GENERAL.—There are authorized to be appropriated $100,000,000 for each of fiscal years 2026 through 2030 to carry out this section.

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

''(h) DATA AND HOSTED PAYLOADS.—Notwithstanding any other provision of law, the Secretary of Commerce may enter into agreements relating to the following:

''(1) The purchase of weather and environmental data and services through contracts with private sector commercial data and service providers.

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

''(i) OMBUDSMAN.—The Under Secretary shall establish or designate at least one Ombudsman position within the Commercial Data Program to implement the rec-

ommendations of the Observing System Council under subsection (f) related to commercial weather and environmental data and services acquisitions. Such an Ombudsman shall act as the liaison between private sector data and service providers and the National Oceanic and Atmospheric Administration with respect to receiving recommendations and resolving issues related to engagement, testing, contracting, or other areas related to the Administration's efforts to acquire commercial weather and environmental data and services.

''(j) REPORT.—Not later than two years after the date of the enactment of this section, the Under Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report evaluating the activities and needed authorities related to data governance and management practices, including acquisition, collection, documentation, quality control, validation, reprocessing, storage, retrieval, dissemination, and long-term preservation activities across all National Oceanic and Atmospheric Administration line, staff, and corporate offices.''.

SEC. 302. COMMERCIAL DATA PILOT PROGRAM.

The Weather Research and Forecasting Innovation Act of 2017 is amended by amending section 303 (15 U.S.C. 8533) to read as follows:

"SEC. 303. COMMERCIAL DATA PILOT PROGRAM.

''(a) PROGRAM ESTABLISHMENT.—Within the Commercial Data Program under section 302, there shall, to the maximum extent practicable, be a Commercial Data Pilot Program to engage with external partners and providers to test and develop shared standards and methodologies for quality, use, licensing, and attribution of observation services and data, and to ensure quality, impact, and compatibility of such services and data with National Oceanic and Atmospheric Administration modeling capabilities, meteorological situational awareness, and forecasting. The Program is authorized to test and evaluate all sources and types of observation services, imagery, products, and data from private sector entities, including new and innovative surface-based, airborne-based, space-based, and coastal- and ocean-based data, metadata, and model components.

''(b) CRITERIA.—The Under Secretary shall ensure that data acquired through the Commercial Data Pilot Program described in subsection (a) meets the most recent standards and specifications required for observation services and data as published pursuant to section 302(d).

''(c) PILOT CONTRACTS.—The Under Secretary shall, through an open competition, regularly enter into pilot contracts with private sector entities capable of providing observation services and data referred to in subsection (a) that meet the standards and specifications published pursuant to section 302(d) for so providing such services and data in a manner that allows the Under Secretary to calibrate and evaluate such services and data for use in National Oceanic and Atmospheric Administration activities.

''(d) ASSESSMENT OF VIABILITY.—The Under Secretary shall annually assess and submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a summary of the pilot contracts entered into pursuant to subsection (c), an assessment of the extent to which such contracts meet the standards and specifications published pursuant to section 302(d), and any additional information determined necessary related to the following:

''(1) The viability of integrating observation services and data from private sector entities into National Oceanic and Atmospheric Administration forecasts and models.

''(2) The expected value added or improvements from such services and data if integrated into Na-

tional Oceanic and Atmospheric Administration forecasts and models.

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

''(4) If the Under Secretary determines it is viable to integrate such services and data into the forecasts and models of the National Oceanic and Atmospheric Administration, the steps to integrate, not later than one year after the date of such determination, such services and data into operational use by the Administration, or any associated challenges in doing so.

''(e) OBTAINING FUTURE DATA.—If an assessment under subsection (d) demonstrates the ability of services and data from private sector entities to meet the standards and specifications published pursuant to section 302(d), the Under Secretary shall carry out the following:

''(1) When cost-effective and feasible, obtain observation services and data from private sector entities through the Commercial Data Program under section 302.

''(2) As early as possible in the acquisition process for any future National Oceanic and Atmos-

pheric Administration satellite system, determine whether there is a suitable, cost-effective, commercial capability available or that will be available to meet applicable instrument, spacecraft, or system requirements before completion of the critical design phase of such planned satellite system.

''(3) If the Under Secretary determines under paragraph (2) that a suitable, cost-effective, commercial capability is or will be available, determine whether and how such capability is in the national interest if developed as a solely governmental system.

''(4) Submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report detailing any determinations made under paragraphs (2) and (3).

''(f) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized to be appropriated pursuant to section 302 to carry out such section, not less than 15 percent of such amounts each fiscal year are authorized to be appropriated to carry out this section.''.

SEC. 303. CONTRACTING AUTHORITY AND AVOIDANCE OF DUPLICATION.

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

"SEC. 304. CONTRACTING AUTHORITY AND AVOIDANCE OF DUPLICATION.

''(a) IN GENERAL.—Consistent with the authorities of other Federal agencies that contract and partner with private sector entities, including under section 3903 of title 41, United States Code, the Under Secretary is authorized to use contracting mechanisms and enter into agreements that use multiyear contract options. In carrying out sections 302 and 303, the Under Secretary shall, to the greatest extent possible, carry out the following:

''(1) Enter into year-long or multiyear contracts using contracting mechanisms that foster resiliency of service and data purchased.

''(2) Partner and contract with multiple observation service and data providers simultaneously to reduce risks of data gaps and improve mission robustness.

''(3) Use authorities, such as additional forms of transaction agreements under section 301, that allow for innovative partnerships with private sector entities.

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

''(c) UNNECESSARY DUPLICATION.—In meeting the requirements under this title, the Under Secretary shall avoid unnecessary duplication between the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, other Federal departments and agencies, and private sector entities, including relating to corresponding expenditures of funds and employment of personnel by carrying out the following:

''(1) Coordinating existing activities with other civilian Federal departments and agencies which provide, contract, or partner with private sector entities to acquire, weather and environmental observations and data.

''(2) Coordinating and soliciting weather and environmental observations and data requirements and needs from other civilian Federal departments and agencies to be acquired by the Commercial Data Program under section 302.

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

agencies utilizing services and data under sections 302 and 303 fairly compensate the National Oceanic and Atmospheric Administration, or the non-Federal entities providing such services or data, as appropriate, for use.''.

SEC. 304. DATA ASSIMILATION, MANAGEMENT, AND SHARING PRACTICES.

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

''SEC. 305. DATA ASSIMILATION, MANAGEMENT, AND SHARING PRACTICES.

''(a) DATA STANDARDS.—The Under Secretary, in collaboration with the weather enterprise, shall seek to establish consistent and open data and metadata standards to support open science, including simple cloud-optimized data formats and application programming interfaces that support findability, accessibility, usability, and preservability.

''(b) DATA INFRASTRUCTURE.—

''(1) IN GENERAL.—The Under Secretary, in consultation with the Chief Information Officer and appropriate program heads, shall consolidate and arrange data infrastructure needs to ensure efficient and effective data transfer between National Oceanic

and Atmospheric Administration offices by considering the use of commercial cloud technologies, or similar hybrid structures, to host and transmit data and metadata.

''(2) FEDERAL PARTNERSHIPS.—In carrying out paragraph (1), the Under Secretary may partner with the heads of other Federal departments and agencies, including the National Aeronautics and Space Administration, the Department of Energy, the United States Space Force, the United States Coast Guard, the United States Navy, the Federal Aviation Administration, the United States Forest Service, the Environmental Protection Agency, the National Science Foundation, and the United States Geological Survey, to collocate data with joint utility and support a transition to cloud architectures, including commercial cloud networks.

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

''(c) DATA SHARING WITH THE WEATHER ENTERPRISE.—

''(1) IN GENERAL.—To the greatest extent practicable, the Under Secretary shall carry out the following:

''(A) Continue to ensure the delivery of data through sound and robust infrastructure, such as data sharing capabilities of the industry proving grounds.

''(B) Make accessible to members of the weather enterprise that are United States persons data that is—

''(i) not subject to redistribution contract permissions; or

''(ii) purchased through the Commercial Data Program under section 302 or shared through international government partners.

''(2) DATA ASSIMILATED INTO MODELS OR FORECASTS.—If data described in paragraph (1)(B) must be assimilated into numerical weather prediction models or automated forecast guidance to satisfy terms of a redistribution contract, the Under Secretary shall make accessible without delay to members of the weather enterprise that are United States persons the numerical weather prediction

model or automated forecast guidance output, as the case may be.

''(d) DATA ASSIMILATION.—

''(1) IN GENERAL.—The Under Secretary, in coordination with the Commercial Data Program under section 302, the National Centers for Environmental Prediction, the National Centers for Environmental Information, the Office of Oceanic and Atmospheric Research, and any other relevant offices within the National Oceanic and Atmospheric Administration, shall establish a program to test, advance, and implement data assimilation methods, which may include artificial intelligence, machine learning, data pre- and post-processing, efficient input and output, and next-generation algorithms.

''(2) DATA ASSIMILATION UNIVERSITY CONSORTIUM.—Through the program established pursuant to paragraph (1), the Under Secretary shall establish a consortium consisting of institutions of higher education (as such term is defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)) to address critical research challenges for data assimilation and foster a growing data assimilation workforce. The consortium shall seek to accomplish the following:

"(A) Solve critical research issues for data assimilation through innovative research.

"(B) Increase significantly the number of students, including Ph.D. candidates and other graduate level students, in data assimilation.

"(C) Use modern software and frameworks, such as the Joint Effort for Data Assimilation Integration, or emerging technologies, such as artificial intelligence and machine learning techniques, to conduct data assimilation research and development and facilitate research-to-operations efforts to improve weather modeling and prediction.

"(D) Identify and prioritize critical research areas in data assimilation and facilitate operations-to-research efforts.

"(E) Establish and enable an effective collaboration infrastructure between National Oceanic and Atmospheric Administration facilities, such as laboratories, centers, or joint agency institutes, and the research community, including a mechanism for external partners to host Administration employees.

"(F) Establish mechanisms to enable all members of the consortium to archive and ac-

cess data required to support the work under this subsection.

''(3) COORDINATION.—In carrying out this subsection, the Under Secretary shall ensure the National Oceanic and Atmospheric Administration and its associated activities focus on research-to-operations and operations-to-research efforts, including by coordinating and collaborating with the Joint Center for Satellite Data Assimilation.

''(4) DATA ASSIMILATION, MANAGEMENT, AND SHARING PRACTICES SECURITY.—The activities authorized under this subsection shall be conducted in a manner consistent with subtitle D of title VI of the Research and Development, Competition, and Innovation Act (enacted as division B of Public Law 117–167; 42 U.S.C. 19231 et seq.).

''(e) STUDY ON DATA MANAGEMENT.—

''(1) IN GENERAL.—Not later than 90 days after the date of the enactment of this section, the Under Secretary shall seek to enter into an agreement with a non-Federal entity to conduct a study on matters concerning data practices and management needs at the National Oceanic and Atmospheric Administration. In conducting the study, the outside entity shall carry out the following:

"(A) Assess the costs and benefits of current data management needs for observational and operational mission requirements.

"(B) Develop recommendations regarding how to make more robust and cost-effective the data portfolio of the Administration.

"(C) Identify data infrastructure technologies and needs that are essential to the performance of modeling systems of the Administration.

"(D) Assess the sharing needs and practices of the Administration for both internal and external dissemination.

"(E) Develop recommendations for methods of data infrastructure sharing, including data purchased from the commercial sector.

"(F) Develop recommendations for data standards, formats, and protocols to support artificial intelligence and machine learning techniques.

"(2) AUTHORIZATION OF APPROPRIATIONS.—Of amounts authorized to be appropriated to the Commercial Data Program under section 302, $1,000,000 shall be available to carry out the study

under paragraph (1) to remain available until expended.''.

SEC. 305. CLERICAL AMENDMENT.

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

TITLE IV—COMMUNICATING WEATHER TO THE PUBLIC

SEC. 401. DEFINITIONS.

In this title:

(1) HAZARDOUS WEATHER OR WATER EVENTS.—The term ''hazardous weather or water events'' means weather or water events that have a high-risk of loss of life or property, including the following:

(A) Severe storms, such as hurricanes and short-fused, small-scale hazardous weather or hydrologic events produced by thunderstorms, including large hail, damaging winds, tornadoes, and flash floods.

(B) Winter storms, such as freezing or frozen precipitation (including freezing rain, sleet,

and snow), or combined effects of freezing or frozen precipitation and strong winds.

(C) Other weather hazards, such as extreme heat or cold, wildfire, drought, dense fog, high winds, and river, coastal, or lakeshore flooding.

(2) INSTITUTION OF HIGHER EDUCATION.—The term ''institution of higher education'' has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

(3) NOAA WEATHER RADIO.—The term ''NOAA Weather Radio'' means the National Oceanic and Atmospheric Administration Weather Radio All Hazards network.

(4) PUBLIC CLOUD.—The term ''public cloud'' means an information technology model in which service providers make computing services, including compute and storage and develop-and-deploy environments and applications, available on-demand to organizations and individuals over the public internet or other means that allows for the widest dissemination of information.

(5) WATCH; WARNING.—

(A) IN GENERAL.—The terms ''watch'' and ''warning'', with respect to a hazardous weather

or water event, mean products issued by the National Oceanic and Atmospheric Administration, intended for consumption by the general public, to alert the general public to the potential for or presence of such event and to inform action to prevent loss of life or property.

(B) EXCEPTION.—The terms ''watch'' and ''warning'' do not include technical or specialized meteorological or hydrological forecasts, outlooks, or model guidance products.

SEC. 402. HAZARDOUS WEATHER OR WATER EVENT RISK COMMUNICATION.

(a) IN GENERAL.—The Under Secretary shall maintain and improve the system of the National Oceanic and Atmospheric Administration by which the risks of hazardous weather and water events are communicated to the general public, with the goal of informing action and encouraging response to prevent loss of life and property.

(b) HAZARD RISK COMMUNICATION IMPROVEMENT AND SIMPLIFICATION.—

(1) IN GENERAL.—The Under Secretary shall maintain a hazard risk communication program (in this subsection referred to as the ''Program''), for the purposes of simplifying and improving the com-

munication of hazardous weather and water event risks.

(2) TERMINOLOGY.—The Program shall identify, eliminate, or modify unnecessary, redundant, or confusing terms for hazardous weather and water event communications and add new terminology, as appropriate.

(3) COMMUNICATIONS IMPROVEMENT.—The Program shall improve the form, content, and methods of hazardous weather and water event communications to more clearly inform action and increase the likelihood that the public takes such action to prevent the loss of life or property.

(4) EVALUATIONS.—The Program shall, in coordination with the performance branch of the National Weather Service, develop metrics for such branch to track and evaluate the degree to which hazardous weather and water event communications inform action and encourage response.

(5) SUPPORT PLAN.—The Program shall develop a plan for the purpose of supporting the activities described in paragraph (3). The plan shall be periodically updated and informed by internal and extramural research and the results of the evalua-

tion of hazardous weather and water event communications conducted under paragraph (4).

(6) METHODS.—In carrying out this subsection, the Program shall develop and implement recommendations that satisfy the following:

(A) Are based on the best and most recent understanding from social, behavioral, risk, and communication science research.

(B) Are validated by social, behavioral, risk, and communication science, taking into account the importance of methods that support reproduction and replication of scientific studies, use of rigorous statistical analyses, and, as applicable, data analysis supported by artificial intelligence and machine learning technologies.

(C) Account for the needs of various demographics, vulnerable populations, and geographic regions.

(D) Account for the differences between various types of weather and water hazards.

(E) Respond to the needs of Federal, State, and local government partners and media partners.

(F) Account for necessary changes in the infrastructure, technology, and protocols for

creating and disseminating federally operated watches and warnings.

(7) COORDINATION.—The Program shall coordinate with the following:

(A) Federal partners, including National Laboratories, cooperative institutes, and regional integrated sciences and assessments programs.

(B) State and local government partners.

(C) Indian Tribes (as such term is defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304)).

(D) Institutions of higher education.

(E) Media partners.

(8) TIMELINESS AND CONSISTENCY.—The Program shall develop best practices and guidance for ensuring timely and consistent communication across public facing platforms that disseminate hazardous weather and water event information.

SEC. 403. HAZARD COMMUNICATION RESEARCH AND ENGAGEMENT.

(a) IN GENERAL.—The Under Secretary may maintain, as appropriate, a program to carry out the following:

(1) Modernize the development and communication of risk-based, statistically reliable, probabilistic hazard information, with the goal of informing appropriate responses to hazardous weather or water events.

(2) Improve the fundamental social, behavioral, economic, risk, and communication science relating to communications, including by means of collecting voluntary data, regarding hazardous weather or water events.

(b) COORDINATION.—In carrying out the program under subsection (a), the Under Secretary shall coordinate and communicate with States, Tribal governments, localities, and emergency managers regarding research priorities and results.

(c) PILOT PROGRAM FOR TORNADO HAZARD COMMUNICATIONS.—

(1) IN GENERAL.—The Under Secretary, in coordination with the VORTEX–USA program under section 103 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8513), as amended by section 103 of this Act, and in collaboration with one or more eligible institutions (or consortia thereof), shall establish a pilot program for tornado hazard communications to test incorporation

of research into operations with respect to tornadoes.

(2) ELIGIBLE INSTITUTION DEFINED.—In this subsection, the term ''eligible institution'' means any of the following:

(A) A historically Black college or university located in an area of persistent poverty that is subjected to frequent severe weather, such as tornadoes, hurricanes, and floods.

(B) An institution of higher education in proximity to a Weather Forecast Office of the National Weather Service.

(d) PILOT STUDY FOR HURRICANE HAZARD COMMUNICATION.—

(1) IN GENERAL.—The Under Secretary, in coordination with the hurricane forecast improvement program under section 104 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8514), as amended by section 104 of this Act, and in collaboration with one or more eligible institutions (or consortia thereof), shall enter into an agreement with an appropriate entity, as determined by the Under Secretary, to conduct a pilot study using a mixed methods approach, including surveys, focus groups, and interviews, to gather information from

hurricane-prone population areas regarding the levels of preparedness of such areas for hurricanes or in response to the National Oceanic and Atmospheric Administration's early forecasts and warnings.

(2) ELEMENTS.—The pilot study under paragraph (1) shall evaluate the following:

(A) Possession of disaster supplies.

(B) Evacuation decisions.

(C) Levels of trust of tropical cyclone information and hurricane path prediction from various sources.

(D) Access to tropical cyclone and hurricane forecasts and warnings in such study participant's first language.

(E) Any reasoning or deliberation by the individuals interviewed as part of the study that may hinder the ability or willingness of the individuals to evacuate.

(3) ADDITIONAL CRITERIA.—The Under Secretary shall publish the methodology of the pilot study under paragraph (1) on a publicly accessible website of the National Oceanic and Atmospheric Administration.

(4) ELIGIBLE INSTITUTION DEFINED.—In this subsection, the term ''eligible institution'' means any of the following:

(A) An institution of higher education, nonprofit organization, or other institution located in a jurisdiction eligible to participate in the program under section 113 of the National Science Foundation Authorization Act of 1988 (42 U.S.C. 1862g).

(B) An institution of higher education, nonprofit organization, or other institution located in proximity to a Weather Forecast Office of the National Weather Service.

(e) HURRICANE SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES.—

(1) IN GENERAL.—The Under Secretary shall carry out research and development activities to improve how the public receives, interprets, responds to, and values hurricane forecasts and warnings.

(2) ELEMENTS.—In conducting activities under paragraph (1), the Under Secretary shall carry out the following:

(A) Conduct a comprehensive review of the manner by which the public receives, interprets, responds to, and makes decisions regarding

hurricane forecasts and warnings, including relating to the following:

(i) How weather observations, downstream models, and processes affect the decision tools or products derived from hurricane forecasts and warnings.

(ii) How hurricane forecasts and warnings generated by decision tools and products are used by emergency managers, governments, and other users to benefit the public and stakeholder groups.

(iii) How past experiences with hurricanes impact the decisionmaking of the general public.

(iv) How the source of such hurricane forecasts and warnings affects interpretation.

(v) How tropical cyclone forecasts and warnings are received and interpreted by the general public.

(vi) How understanding of and response to hurricane forecasts and warnings varies across demographic groups, including the elderly, people with disabilities, and other vulnerable populations.

(vii) The effect of language barriers on the accessibility of hurricane forecasts and warnings.

(viii) How understanding of and response to such hurricane forecasts and warnings varies across geographic areas, including rural, urban, and suburban areas.

(B) Identify communication data gaps based on the review conducted pursuant to subparagraph (A).

(C) Carry out research, including data collection and baseline assessments, in coordination with the hurricane forecast improvement program under section 104 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8514), as amended by section 104 of this Act, to evaluate and quantify the economic value of extending lead times of tropical cyclone and hurricane forecasts and warnings, including identifying the most affected or vulnerable populations and potential impacts to those populations of extending leads times.

(D) Using the post-storm surveys and assessments conducted under section 406 of this

Act to conduct retrospective or ex ante assessments of previous hurricane forecasts and warnings to better understand the key components of such forecasts and warnings that affected actions or initiated behavior changes.

(E) Conduct cost-benefit analyses of forecasts and warnings improvement alternatives developed through the hurricane forecast improvement program under section 104 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8514), as amended by section 104 of this Act.

(F) Conduct assessments of the risk to the elderly for pre-, during, and post-storm periods in regions and communities with significant elderly populations, including retirement communities.

SEC. 404. NATIONAL WEATHER SERVICE COMMUNICATIONS IMPROVEMENT.

(a) IMPROVEMENT OF NWS INSTANT MESSAGING SERVICE.—The Director of the National Weather Service shall improve the instant messaging service used by personnel of the National Weather Service by implementing, not later than October 1, 2027, a commercial off-the-shelf

communications solution that replaces the instant messaging service commonly referred to as ''NWSChat''.

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

(1) be hosted on the public cloud; and

(2) satisfy requirements set forth by the Director of the National Weather Service to ensure such solution—

(A) best accommodates future growth;

(B) performs successfully with increased numbers of users;

(C) is easy to use for the majority of users; and

(D) is similar to systems already in commercial use.

SEC. 405. NOAA WEATHER RADIO MODERNIZATION.

(a) IN GENERAL.—The Under Secretary shall, to the maximum extent practicable, expand coverage of the NOAA Weather Radio and ensure its reliability. In carrying out this subsection, the Under Secretary shall carry out the following:

(1) Maintain support for existing systems serving areas not covered by or having poor quality cellular service.

(2) Ensure consistent maintenance and operations monitoring, with timely repairs to broadcast transmitter site equipment and antennas.

(3) Enhance the ability to amplify Non-Weather Emergency Messages via NOAA Weather Radio, as necessary.

(4) Acquire additional transmitters as required to expand coverage to rural and underserved communities, units of the National Park System, and National Recreation Areas.

(b) MODERNIZATION INITIATIVE.—To the maximum extent practicable, the Under Secretary shall modernize NOAA Weather Radio to ensure its capabilities and coverage remain valuable to the public. In carrying out this subsection, the Under Secretary shall carry out the following:

(1) Upgrade telecommunications infrastructure of NOAA Weather Radio to accelerate the transition of broadcasts to internet protocol-based communications over non-copper media.

(2) Accelerate software upgrades to the Advanced Weather Interactive Processing System, or any relevant system successors, in order to implement partial county notifications and alerts.

(3) Enhance accessibility and usability of NOAA Weather Radio data and feeds with feedback from relevant stakeholders, including the private sector.

(4) Develop options, including satellite backup capability and commercial provider partnerships, for NOAA Weather Radio continuity of service in the event of Weather Forecast Office outages.

(5) Research and develop alternative options, including microwave capabilities, to transmit NOAA Weather Radio signals to transmitters that are remote or do not have internet protocol capability.

(6) Transition critical applications to the Integrated Dissemination Program, or any relevant program successors.

(c) PRIORITY.—In carrying out subsection (b), the Under Secretary shall prioritize practices, capabilities, and technologies recommended in accordance with the assessment under subsection (d) to maximize the accessibility of NOAA Weather Radio, particularly in remote and underserved areas of the United States.

(d) ASSESSMENT FOR MANAGEMENT AND DISTRIBUTION.—Not later than one year after the date of the enactment of this Act, the Under Secretary shall complete an assessment of access to NOAA Weather Radio. In con-

ducting such assessment, the Under Secretary shall take into consideration and provide recommendations regarding the following:

(1) The need for continuous, adequate, and operational real-time broadcasts of the NOAA Weather Radio in both urban and rural areas.

(2) Input from relevant stakeholders on the compatibility of NOAA Weather Radio data with third-party platforms that provide online services, such as websites and mobile device applications, or provide NOAA Weather Radio access.

(3) The manner by which existing or new management systems may promote consistent, efficient, and compatible access to NOAA Weather Radio.

(4) The ability of the National Oceanic and Atmospheric Administration to aggregate real-time broadcast feeds at one or more central locations.

(5) Effective coordination between agencies with responsibilities relating to emergencies and natural disasters.

(6) The potential effects of an electromagnetic pulse or geomagnetic disturbance on NOAA Weather Radio.

(7) Any other function or element the Under Secretary considers appropriate.

SEC. 406. POST-STORM SURVEYS AND ASSESSMENTS.

(a) IN GENERAL.—The Under Secretary shall perform one or more post-storm surveys and assessments following every hazardous weather or water event determined by the Under Secretary to be of sufficient societal importance to warrant a post-storm survey and assessment.

(b) COORDINATION.—The Under Secretary shall coordinate with Federal, State, and local governments, private entities, and relevant institutions of higher education (or a consortia thereof) when conducting post-storm surveys and assessments under this section to optimize data collection, sharing, integration, archiving, and access, as appropriate for research needs.

(c) DATA AVAILABILITY.—The Under Secretary shall make the appropriate data obtained from each post-storm survey or assessment conducted under this section available to the public as soon as practicable after conducting each such survey or assessment.

(d) IMPROVEMENT.—In carrying out this section, the Under Secretary shall carry out the following:

(1) Examine the role of uncrewed aerial and marine systems in data collection during post-storm surveys and assessments conducted under this section.

(2) Identify gaps in tactics and procedures and update such tactics and procedures to enhance the

efficiency and reliability of data obtained from post-storm surveys and assessments.

(3) To the maximum extent practicable, increase the number of post-storm community impact studies, particularly among underobserved, underserved, or highly vulnerable populations, including by carrying out the following:

(A) Surveying individual responses.

(B) Conducting reviews of the accuracy of prior risk evaluations.

(C) Evaluating the efficacy of prior mitigation activity.

(D) Gathering survivability statistics.

(4) As appropriate, integrate community-based, social, behavioral, risk, communication, and economic sciences elements into existing post-storm surveys and assessments, including elements related to the efficacy of forecast and warning information that was shared with the public, barriers that affected the ability of the public to take action, and any challenges with respect to messaging about the hazardous weather or water event at issue.

(e) SUPPORT FOR EMPLOYEES.—The Under Secretary shall provide training, resources, and access to professional counseling to support the emotional and mental

health and well-being of employees conducting post-storm surveys and assessments under this section.

(f) EXEMPTION.—Subchapter I of chapter 35 of title 44, United States Code, shall not apply to the collection of information during a survey or assessment conducted under subsection (a).

SEC. 407. GOVERNMENT ACCOUNTABILITY OFFICE REPORT ON ALERT DISSEMINATION FOR HAZARDOUS WEATHER OR WATER EVENTS.

(a) IN GENERAL.—Not later than 18 months after the date of the enactment of this Act, the Comptroller General of the United States shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that examines the information technology infrastructure of the National Weather Service, specifically regarding the system for timely public notification via alerts and updates regarding hazardous weather or water events.

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

(1) An analysis of the information technology infrastructure of the National Weather Service, including software and hardware capabilities and limitations, including an examination of server and data

storage methods, broadband, data management, and data sharing.

(2) An identification of secondary and tertiary fail-safes for the timely distribution to the public of notifications via alerts and updates regarding hazardous weather or water events.

(3) A determination of the extent to which public notifications via alerts and updates regarding hazardous weather or water events have been delayed and an identification of possible improvements or corrective measures to address latency in the notification process.

(4) An assessment of whether collaboration with other Federal departments and agencies, States, or private entities could reduce delays in notifications to the public.

(5) A description of actions being undertaken to better identify critical steps in public notification via alerts and updates for hazardous weather or water events that may be vulnerable to disruption or failure in the event of communication, technologic, or computational failure.

(6) The geographical differences in availability and effectiveness of rural systems, including an estimated number of rural areas affected by unreliable

or unavailable systems and barriers to obtain or upgrade such systems.

SEC. 408. DATA COLLECTION MANAGEMENT AND PROTECTION.

(a) DATA COLLECTION.—The Under Secretary may collect social, behavioral, and economic data, including data relating to Federal communication of hazardous weather or water events and the public response to such communications. Where appropriate, the Under Secretary shall encourage the collection of secondary data, purchase data, or partner with the private sector to obtain data.

(b) DATA MANAGEMENT.—The Under Secretary shall establish and maintain a central repository system for the National Oceanic and Atmospheric Administration for data related to the communication of and related public response to hazardous weather or water events, including data developed or received pursuant to this title.

(c) PROTECTION OF DATA.—The Under Secretary shall ensure that data is collected, managed, and used by the National Oceanic and Atmospheric Administration in accordance with legal, regulatory, and contractual obligations, including chapter 31 of title 44, United States Code, and the Foundations for Evidence-Based Policymaking Act of 2018 (Public Law 115–435).

(d) DIGITAL WATERMARKING.—The Under Secretary shall develop methods to reduce the likelihood of unauthorized tampering with online public notifications of hazardous weather or water events, such as developing digital watermarks.

(e) POLICIES AND PROCEDURES.—The Under Secretary shall establish policies and procedures for the collection, archiving, and managing of data related to community response, including the response of effected or vulnerable populations, to hazardous weather or water events.

TITLE V—IMPROVING WEATHER INFORMATION FOR AGRICULTURE AND WATER MANAGEMENT

SEC. 501. WEATHER AND CLIMATE INFORMATION IN AGRICULTURE AND WATER MANAGEMENT.

Section 1762 of the Food Security Act of 1985 (15 U.S.C. 8521) is amended—

(1) by amending subsection (c) to read as follows:

''(c) FUNCTIONS.—

''(1) IN GENERAL.—The Under Secretary shall carry out the following:

''(A) Conduct and support research to improve understanding of subseasonal-to-seasonal

predictability for temperature, precipitation, and other Earth system variables and applications.

''(B) Collect and use data to make usable, reliable, and timely foundational forecasts of subseasonal-to-seasonal temperature and precipitation.

''(C) Support the advancement of multi-model ensemble forecast systems and forecast verification and evaluation capacity, including by carrying out the following:

''(i) Developing advanced coupled data assimilation methods using robust Earth system observational data.

''(ii) Developing improved coupled subseasonal-to-seasonal ensemble prediction systems.

''(iii) Improving exchanges and interactions between datasets across different models and Earth system observations to increase model accuracy of local relationships between and drivers of ocean, land, snow, and ice observations.

"(iv) Developing data management strategies to support operations and research activities.

"(D) Leverage existing research and models from the weather and Earth system enterprises to improve the forecasts under subparagraph (B).

"(E) Accelerate the operationalization of emerging modeling technologies developed to support and assist the cross-development of fully coupled subseasonal-to-seasonal forecast systems, including during collaborations with other agencies and entities.

"(F) Determine and provide information on how subseasonal-to-seasonal temperature and precipitation may relate to the following:

"(i) Droughts.

"(ii) Fires.

"(iii) Tornadoes.

"(iv) Hurricanes.

"(v) Floods, storm surges, and coastal inundation.

"(vi) Heat waves and marine heat waves.

''(vii) Winter storms, snowpack, and permafrost thaw.

''(viii) Sea ice conditions.

''(ix) Other high-impact weather or relevant weather disasters.'';

(2) by amending subsection (h) to read as follows:

''(h) SUBSEASONAL-TO-SEASONAL FORECASTING PILOT PROJECTS.—

''(1) ESTABLISHMENT.—The Under Secretary shall establish within the United States Weather Research Program of the Office of Oceanic and Atmospheric Research of the National Oceanic and Atmospheric Administration not fewer than two pilot projects, in accordance with paragraph (2), to support improved subseasonal-to-seasonal precipitation forecasts for the following:

''(A) Water management in areas of the United States in which there is—

''(i) a high level of drought; and

''(ii) a reliance on reservoirs for water storage.

''(B) Agriculture in the central United States.

''(2) OBJECTIVES.—In carrying out this subsection, the Under Secretary shall ensure the following:

''(A) A pilot project under subparagraph (A) of paragraph (1) addresses key science challenges to improving forecasts and developing related products for water management, including the following:

''(i) Improving operational model resolution, both horizontal and vertical, to resolve issues associated with mountainous terrain, such as intensity of precipitation and relative fraction of rain versus snow precipitation.

''(ii) Improving modeling of interstate or cross-boundary water movement and storage through rivers, tributaries, and aquifers with relation to water availability.

''(iii) Improving fidelity in the operational modeling of the atmospheric boundary layer in mountainous regions.

''(iv) Resolving challenges in predicting winter atmospheric circulation and storm tracks, including periods of blocked versus unblocked flow over the eastern

North Pacific Ocean and western United States.

''(v) Utilizing outcomes from the atmospheric rivers forecast improvement program under section 204 of the Weather Act Reauthorization Act of 2025 and the precipitation forecast improvement program under section 603 of the Weather Research and Forecasting Innovation Act of 2017 to produce operational tools and services.

''(vi) Improving the quality and temporal and spatial resolution of observations and accurate operational modeling of air-sea interactions, and the influence of oceans on subseasonal and seasonal forecasting.

''(B) A pilot project under subparagraph (B) of paragraph (1) addresses key science challenges to improving forecasts and developing related products for agriculture in the central United States, including the following:

''(i) Improving the quality and temporal and spatial resolution of observations and accurate operational modeling of the

land surface and hydrologic cycle, including soil moisture and flash drought processes.

''(ii) Improving fidelity in the operational modeling of warm season precipitation processes.

''(iii) Understanding and predicting large-scale upper-level dynamical flow anomalies that occur in spring and summer.

''(iv) Improving modeling of interstate or cross-boundary water movement and storage through rivers, tributaries, and aquifers with relation to water availability for agriculture.

''(3) ACTIVITIES.—A pilot project under this subsection shall include activities that carry out the following:

''(A) Best implement recommendations of the 2020 Report of the National Weather Service, entitled 'Subseasonal and Seasonal Forecasting Innovation: Plans for the Twenty-First Century'.

''(B) Achieve measurable objectives for operational forecast improvement.

"(C) Engage with, and leverage the resources of the following:

"(i) Institutions of higher education (as such term is defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)).

"(ii) A consortia of institutions as described under clause (i).

"(iii) Entities within the National Oceanic and Atmospheric Administration in existence as of the date of the enactment of this subsection, including Regional Climate Centers and the National Centers for Environmental Information.

"(iv) Other Federal agencies, as appropriate.

"(D) Are carried out in coordination with the Assistant Administrator for the Office of Oceanic and Atmospheric Research and the Director of the National Weather Service.

"(4) SUNSET.—The authority under this subsection shall terminate on the date that is five years after the date of the enactment of this subsection."; and

(3) by amending subsection (j) to read as follows:

''(j) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $50,300,000 for each of fiscal years 2026 through 2030 to carry out the activities under this section.''.

SEC. 502. NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM.

(a) IN GENERAL.—Section 3 of the National Integrated Drought Information System Act of 2006 (15 U.S.C. 313d) is amended—

(1) in subsection (a), by striking '', through the National Weather Service and other appropriate weather and climate programs in the National Oceanic and Atmospheric Administration,'';

(2) in subsection (b)—

(A) in paragraph (1)—

(i) in subparagraph (A), by striking ''and'' after the semicolon;

(ii) in subparagraph (B), by inserting ''and'' after the semicolon; and

(iii) by adding at the end the following new subparagraph:

''(C) incorporates flash drought research and tools to enhance timely response;'';

(B) in paragraph (5), by striking ''improvements in seasonal precipitation and temperature, subseasonal precipitation and temperature, and low flow water prediction; and'' and inserting ''support improvements in subseasonal to seasonal precipitation and temperature, and low flow water prediction;'';

(C) in paragraph (6), by striking the period and inserting a semicolon; and

(D) by adding at the end the following new paragraphs:

''(7) advance and deploy next-generation technologies related to drought, such as monitoring, preparedness, and forecasting capabilities utilizing artificial intelligence, machine learning, and cloud technologies;

''(8) use observational networks, including the National Weather Service cooperative observer program and State or regional hydrological monitoring projects;

''(9) refine drought indicators across multiple spatial and temporal scales;

''(10) improve decision-support products;

''(11) optimize data and resources from across the Federal Government;

''(12) investigate and address data gaps, including snowpack monitoring, space-based or in situ soil moisture monitoring, groundwater data, and data related to rapid intensification events; and

''(13) engage with, and leverage the resources of, entities within the National Oceanic and Atmospheric Administration in existence as of the date of the enactment of the Weather Act Reauthorization Act of 2025 to improve coordination of water monitoring, forecasting, and management.'';

(3) in subsection (c)—

(A) in paragraph (2), by striking ''and'' after the semicolon;

(B) in paragraph (3), by striking the period and inserting ''; and''; and

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

''(4) in partnership with the National Mesonet Program, establish memoranda of understanding to provide coordinated, high-quality data.''; and

(4) by adding at the end the following:

''(g) MODELING UPDATE.—Not later than one year after the date of the enactment of this subsection, the Under Secretary, acting through the National Integrated Drought Information System and the Climate Prediction

Center of the National Weather Service, shall develop a plan to incorporate existing drought products of the National Oceanic and Atmospheric Administration and improved dynamical and statistical forecast modeling tools into probabilistic forecasts.''.

(b) AUTHORIZATION OF APPROPRIATIONS.—Section 4 of the National Integrated Drought Information System Act of 2006 (Public Law 109–430; 15 U.S.C. 313d note) is amended to read as follows:

''SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

''There are authorized to be appropriated to carry out this Act the following:

''(1) $15,000,000 for fiscal year 2026.

''(2) $15,500,000 for fiscal year 2027.

''(3) $16,000,000 for fiscal year 2028.

''(4) $16,500,000 for fiscal year 2029.

''(5) $17,000,000 for fiscal year 2030.''.

SEC. 503. NATIONAL MESONET PROGRAM.

(a) PROGRAM.—The Under Secretary shall maintain the National Mesonet Program (referred to in this section as the ''Program''), which shall carry out the following:

(1) Obtain observations to improve understanding of and forecast capabilities for atmospheric, drought, fire, and water events, with a prioritization on leveraging available commercial, academic, and

other non-Federal Government environmental data to enhance coordination across the private, public, and academic sectors of the weather enterprise in the United States.

(2) Establish means to integrate greater density and more types of environmental observations into the Program on an annual basis, including by encouraging local and regional networks of environmental monitoring stations and in situ sensor networks, including soil moisture and ground-based profilers, to participate in the Program.

(3) Establish memoranda of understanding with networks outside of the scope of the Program in furtherance of this section.

(4) Coordinate with satellite data and services acquired through the Commercial Data Program under section 302 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8532), as amended by section 401 of this Act.

(b) PROGRAM ELEMENTS.—In carrying out the Program, the Under Secretary shall carry out the following:

(1) Increase data density by carrying out the following:

(A) Improving and increasing the quantity and density of environmental observations used

by the Administration and the National Weather Service to support baseline forecasts, including nowcasts, warnings, and hyper local forecasts that protect individuals, businesses, agricultural production, food security, military, and government agencies in the United States, and enabling such individuals and entities to operate in a safe, efficient, and orderly manner.

(B) Yielding increased quantities of boundary-layer data to improve numerical weather prediction performance, including in subseasonal-to-seasonal timescales.

(C) Identifying available terrestrial or marine environmental data, or quantifiable gaps in such data, to improve the understanding of air-sea interactions.

(D) Supporting the National Weather Service in reaching its target of a 30-minute warning time for severe weather through better predictive model algorithms driven by increasingly effective observations.

(2) Monitor local meteorological conditions by carrying out the following:

(A) Acquiring soil and moisture data to monitor soil moisture, vegetation water content,

and moisture loss from evaporation, in support of operational forecasting, the National Integrated Drought Information System, and local commercial, agricultural, and emergency management needs.

(B) Supporting the National Coordinated Soil Moisture Monitoring Network in acquiring soil moisture and related data to support the development of decision-support products and other information services.

(C) Expanding and enhancing environmental observational networks in the roadway environment to provide real-time road weather and surface conditions for surface transportation and related economic sectors.

(3) Administer the Program by carrying out the following:

(A) Obtaining data in furtherance of this section only when demonstrably cost-effective and meeting or exceeding data quality standards available to the National Oceanic and Atmospheric Administration (referred to in this section as the ''Administration'').

(B) Subject to subparagraph (A), leveraging existing networks of environmental

monitoring stations, including supplemental radar systems, to increase the quantity and density of environmental observations and data available to the Administration.

(C) Providing the critical technical and administrative infrastructure needed to facilitate rapid integration and sustained use of new and emerging networks of environmental monitoring stations anticipated in coming years from non-Federal Government sources.

(D) Coordinating with existing data developed by the Administration and used for forecasts, including data from the National Environmental Satellite, Data, and Information Service, the Integrated Ocean Observing System, the Global Ocean Monitoring and Observing Program, the National Data Buoy Center, and the National Ocean Service.

(E) Identifying and communicating to the Office of Oceanic and Atmospheric Research and other partners priorities of research and development needed to advance observations in the Program.

(c) FINANCIAL AND TECHNICAL ASSISTANCE.—

(1) IN GENERAL.—In furtherance of the Program, in a fiscal year, the Under Secretary may award not less than 15 percent of the amount appropriated for the Program for such fiscal year for financial assistance to State, Tribal, private, and academic entities seeking to build, expand, or upgrade equipment and capacity of mesonet systems.

(2) OTHER FEDERAL AWARDS.—Financial assistance under this subsection may be made in coordination with and in addition to awards from other Federal agencies.

(3) AGREEMENTS.—Before receiving financial assistance under paragraph (1), the State, Tribal, private, or academic entity seeking financial assistance under this subsection shall enter into an agreement with the Under Secretary to provide data to the Program, subject to verification by the Program of the relative operational value and evaluation of the cost of such data, for use in weather prediction, severe weather warnings, and emergency response.

(4) ASSISTANCE AND OTHER SUPPORT.—The Under Secretary may provide the following:

(A) Technical assistance, project implementation support, and guidance to State, Trib-

al, private, and academic entities seeking financial assistance under this subsection.

(B) Technical and financial assistance for maintenance of monitoring stations in underrepresented or remote areas of the country where it is financially unfeasible for one entity to operate such stations without such assistance.

(5) TERMS.—In providing financial assistance under this subsection, the Under Secretary shall establish terms to ensure that each State, Tribal, private, or academic entity that receives financial assistance under this subsection receives a level of support commensurate with the quality and other characteristics of the data to be provided.

(6) DETERMINATION.—A State, Tribal, private, or academic entity may only receive financial assistance under this subsection if the Under Secretary determines such entity will receive sufficient financial support from non-Federal Government sources and fully maintain the quality of the mesonet system and associated data standards required by the Program for a period of not less than five years.

(7) PRIORITY.—The Under Secretary shall prioritize providing assistance under paragraph (1)

to not fewer than one entity in a remote area or an area that has a lack of environmental monitoring stations described in subsection (a)(2).

(d) ADVISORY COMMITTEE.—

(1) IN GENERAL.—The Under Secretary shall ensure the Program has an active advisory committee of subject matter experts to make recommendations to the Administration on the identification, implementation, procurement, and tracking of data needed to supplement the Program, and recommend improvements, expansions, and acquisitions of available data.

(2) DESIGNATION OF EXISTING COMMITTEE.—The Under Secretary may designate an existing advisory committee, subcommittee, or working group of the Federal Government, including the Science Advisory Board of the Administration, to carry out the requirement under paragraph (1).

(3) ACADEMIC EXPERTISE.—The advisory committee under paragraph (1), in consultation with the Program, shall include expertise from one or more institutions of higher education (as such term is defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)) to assist the advisory committee to identify, evaluate, and recommend poten-

tial partnerships, regional or subregional consortia, and collaborative methods that would expand the number of participants and volume of data in the Program.

(e) REGULAR BRIEFINGS.—

(1) IN GENERAL.—Not less frequently than annually through 2035, the Under Secretary shall provide regular briefings to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on all activities under the Program.

(2) BRIEFING CONTENT.—Each briefing required under paragraph (1) shall include information relating to the following:

(A) Efforts to implement the activities described in subsection (b).

(B) Any financial or technical assistance provided pursuant to subsection (c).

(C) Efforts to address recommendations received from the advisory committee under subsection (d), if any.

(D) The potential need and associated benefits of a coastal and ocean mesonet, or other emerging areas of weather data needs.

(E) Progress toward eliminating gaps in weather observation data in States and regions of the United States.

(F) Any other topic the Under Secretary determines relevant.

(f) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized to be appropriated to the National Weather Service, there shall be available not more than the following amounts to carry out this section:

(1) $50,000,000 for fiscal year 2026.

(2) $55,000,000 for fiscal year 2027.

(3) $61,000,000 for fiscal year 2028.

(4) $68,000,000 for fiscal year 2029.

(5) $70,000,000 for fiscal year 2030.

SEC. 504. NATIONAL COORDINATED SOIL MOISTURE MONITORING NETWORK.

(a) IN GENERAL.—The Under Secretary, in collaboration with the Secretary of Agriculture, the Director of the United States Geological Survey, the Administrator of the National Aeronautics and Space Administration, and the heads of other relevant Federal agencies and departments, shall support the development, deployment, and maintenance of soil moisture monitoring networks by managing the National Coordinated Soil Moisture Monitoring Network (in this section referred to as the ''Network'')

within the National Integrated Drought Information System.

(b) ACTIVITIES.—The Under Secretary shall ensure the Network includes activities that carry out the following:

(1) Establishing a visible, user-friendly website.

(2) Developing a set of criteria for high-quality data sources.

(3) Supporting research necessary to develop or improve soil moisture monitoring products at a national scale.

(4) Increasing the number of long-term, high-quality, in situ and remote sensing soil moisture monitoring stations across the United States.

(5) Sharing methodologies and validation protocols with the private sector.

(6) Engaging with the citizen science community.

(7) Developing, releasing, and promoting new, nationwide point-based and gridded soil moisture data products that meet the needs of diverse end-user groups.

(8) Supporting community building and outreach to the network of individuals engaged with soil

moisture information delivery, from data provision to end-user decisionmaking.

SEC. 505. NATIONAL WATER CENTER.

Section 301 of the Coordinated Ocean Observations and Research Act of 2020 (42 U.S.C. 10371) is amended—

(1) in subsection (a)—

(A) in paragraph (1)(A)—

(i) in the matter preceding clause (i), by inserting ", within the Office of Water Prediction of the National Weather Service," after "shall establish";

(ii) in clause (i), by striking "and" after the semicolon;

(iii) in clause (ii), by striking the period and inserting "; and"; and

(iv) by adding at the end the following new clause:

"(iii) to lead the transition of water research by the Federal Government, including model development, into operations of the National Oceanic and Atmospheric Administration and the National Weather Service."; and

(B) in paragraph (2), by adding at the end the following new subparagraphs:

''(F) Serving as the primary Center within the National Oceanic and Atmospheric Administration for research, development, collaboration, and coordination of the water research and forecast activities of the Administration and other centers and networks of the Federal Government, including those of the Department of Agriculture, the Army Corps of Engineers, the Bureau of Reclamation, the United States Geological Survey, and the Federal Emergency Management Agency.

''(G) Integrating and promoting consistency among national and regional hydrological forecast operations and service delivery.''; and

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

''(3) INCORPORATION INTO UNIFIED FORECAST SYSTEM.—The Under Secretary shall use the Weather and Climate Operational Supercomputing System, or any other successor system, to support the development and implementation of advanced water resources modeling capabilities under paragraph

(2)(B) and shall incorporate those modeling capabilities into the unified forecast system.'';

(2) by striking subsection (b);

(3) by redesignating subsection (c) as subsection (b);

(4) by inserting after subsection (b), as redesignated by paragraph (3), the following:

''(c) ORGANIZATION.—The Under Secretary, acting through the Director of the Office of Water Prediction of the National Weather Service, shall carry out the following:

''(1) Supervise and oversee the administration, management, and operations of each River Forecast Center of the National Weather Service and coordinate such administration, management, and operations with the National Water Center.

''(2) Administer the duties and activities of the National Oceanic and Atmospheric Administration related to the Cooperative Institute for Research to Operations in Hydrology, or any successor entity, and coordinate the activities of the Institute with the National Water Center.''; and

(5) in subsection (d)(4), by striking ''fiscal year 2024'' and inserting ''each of fiscal years 2026 through 2030''.

SEC. 506. SATELLITE TRANSFERS BRIEFING.

Not later than 180 days after the date of the enactment of this Act, the Secretary of Commerce shall brief the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives on the Department of Commerce's authorities and policies, and Federal Government-wide policies, related to transferring any portion of the weather satellite systems operated by the Department of Commerce to any other Federal department or agency, including the following:

(1) A description of the process for decommissioning a Department of Commerce operational weather satellite, any existing agreements related to transfers of weather satellites, whether decommissioned or not, and any reimbursable agreements related to the transfer of physical property or the operation of Department of Commerce weather satellites on behalf of any other Federal department or agency.

(2) A summary of any Department of Commerce plans for potential transfer of existing or future weather satellite systems to any other Federal department or agency.

TITLE VI—HARMFUL ALGAL BLOOM AND HYPOXIA RESEARCH AND CONTROL

SEC. 601. SHORT TITLE.

This title may be cited as the ''Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2025''.

SEC. 602. AMENDMENTS TO THE HARMFUL ALGAL BLOOMS AND HYPOXIA RESEARCH AND CONTROL ACT OF 1998.

(a) ASSESSMENTS.—

(1) IN GENERAL.—Section 603 of the Harmful Algal Blooms and Hypoxia Research and Control Act of 1998 (33 U.S.C. 4001) is amended—

(A) in the section heading, by striking ''**ASSESSMENTS**'' and inserting ''**TASK FORCE, ASSESSMENTS, AND ACTION STRATEGY**'';

(B) in subsection (a)—

(i) by redesignating paragraphs (13) and (14) as paragraphs (14) and (15), respectively; and

(ii) by inserting after paragraph (12) the following new paragraph:

''(13) the Department of Energy;'';

(C) by striking subsections (b), (c), (d), (e), (g), (h), and (i);

(D) by redesignating subsection (f) as subsection (b);

(E) in subsection (b), as so redesignated—

(i) in paragraph (1), in the first sentence, by striking ''coastal waters including the Great Lakes'' and inserting ''marine, estuarine, and freshwater systems''; and

(ii) in paragraph (2)—

(I) by amending subparagraph (A) to read as follows:

''(A) examine—

''(i) the causes and ecological consequences of hypoxia on marine and aquatic species in their environments; and

''(ii) the costs of hypoxia, including impacts on food safety and security;'';

(II) by redesignating subparagraphs (B), (C), and (D) as subparagraphs (D), (E), and (F), respectively;

(III) by inserting after subparagraph (A) the following new subparagraphs:

''(B) examine the effect of other environmental stressors on hypoxia;

''(C) evaluate alternatives for reducing, mitigating, and controlling hypoxia and its environmental impacts;'';

(IV) in subparagraph (D), as redesignated by subclause (II), by inserting '', social,'' after ''ecological''; and

(V) in subparagraph (E), as redesignated by subclause (II), by striking ''hypoxia modeling and monitoring data'' and inserting ''hypoxia modeling, forecasting, and monitoring and observation data''; and

(F) by adding at the end the following new subsections:

''(c) ACTION STRATEGY AND SCIENTIFIC ASSESSMENT FOR MARINE AND FRESHWATER HARMFUL ALGAL BLOOMS.—

''(1) IN GENERAL.—Not less frequently than once every five years, the Task Force shall complete and submit to Congress an action strategy for harmful algal blooms in the United States.

''(2) ELEMENTS.—Each Action Strategy shall—

''(A) examine, and include a scientific assessment of, marine and freshwater harmful algal blooms, including such blooms—

''(i) in the Great Lakes;

''(ii) in the upper reaches of estuaries;

''(iii) in freshwater lakes and rivers;

''(iv) in coastal and marine waters; and

''(v) that originate in freshwater lakes or rivers and migrate to coastal waters;

''(B) examine the causes, ecological consequences or physiological consequences on fish function, and economic or sociocultural impacts, including food safety and security, of harmful algal blooms;

''(C) examine the effect of other environmental stressors on harmful algal blooms;

''(D) examine potential methods to prevent, control, and mitigate harmful algal blooms and the potential ecological, social, cultural, and economic costs and benefits of such methods;

''(E) identify priorities for research needed to advance techniques and technologies to de-

tect, predict, monitor, respond to, and minimize the occurrence, duration, and severity of harmful algal blooms, including recommendations to eliminate significant gaps in harmful algal bloom forecasting, monitoring, and observation data;

''(F) evaluate progress made by, and the needs of, activities and actions of the Task Force to prevent, control, and mitigate harmful algal blooms;

''(G) identify ways to improve coordination and prevent unnecessary duplication of effort among Federal agencies with respect to research on harmful algal blooms; and

''(H) include regional chapters relating to the requirements described in this paragraph in order to highlight geographically and ecologically diverse locations with significant ecological, social, cultural, and economic impacts from harmful algal blooms.

''(d) CONSULTATION.—In carrying out subsections (b) and (c), the Task Force shall consult with the following:

''(1) States, Indian tribes, and local governments.

''(2) Appropriate industries (including fisheries, agriculture, and fertilizer), academic institutions, and nongovernmental organizations with relevant expertise.''.

(2) CLERICAL AMENDMENT.—The table of contents in section 2 of the Coast Guard Authorization Act of 1998 (Public Law 105–383; 112 Stat. 3412; 136 Stat. 1268) is amended by amending the item relating to section 603 to read as follows:

''Sec. 603. Task Force, assessments, and Action Strategy.''.

(3) CONFORMING AMENDMENT.—Section 102 of the Harmful Algal Bloom and Hypoxia Amendments Act of 2004 (33 U.S.C. 4001a) is amended by striking ''In developing'' and all that follows through ''management.''.

(b) NATIONAL HARMFUL ALGAL BLOOM AND HYPOXIA PROGRAM.—Section 603A of the Harmful Algal Blooms and Hypoxia Research and Control Act of 1998 (33 U.S.C. 4002) is amended—

(1) in subsection (a)—

(A) in paragraph (1)—

(i) by striking ''predicting,'' and inserting ''monitoring, observing, forecasting,''; and

(ii) by striking ''and'' after the semicolon; and

(B) by striking paragraph (2) and inserting the following new paragraphs:

''(2) the scientific assessment submitted under section 603(b); and

''(3) the Action Strategy.'';

(2) in subsection (c)—

(A) in paragraph (3), by striking ''ocean and Great Lakes science and management programs and centers'' and inserting ''programs and centers relating to the science and management of marine, estuarine, and freshwater systems''; and

(B) in paragraph (5), by inserting ''while recognizing each agency is acting under its own independent mission and authority'' before the semicolon;

(3) in subsection (d), by striking ''Except as provided in subsection (h), the'' and inserting ''The'';

(4) in subsection (e)—

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

''(2) examine the causes, ecological consequences, and costs of harmful algal blooms and hypoxia;'';

(B) in paragraph (3)—

(i) in subparagraph (B), by inserting ", including the annual Gulf of Mexico hypoxia zone mapping cruise" after "Program";

(ii) in subparagraph (C), by striking "and" after the semicolon; and

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

"(E) to identify opportunities to improve monitoring of harmful algal blooms and hypoxia, with a particular focus on waters that may affect fisheries, public health, or subsistence harvest;

"(F) to evaluate adaptation and mitigation strategies to address the impacts of harmful algal blooms and hypoxia;

"(G) to support the resilience of the seafood industry to harmful algal blooms and to expand access to testing for harmful algal bloom toxins, including for subsistence and recreational harvesters, through innovative methods that increase the efficiency and effectiveness of such testing in rural and remote areas;

''(H) to support sustained observations to provide State and local entities, Indian tribes, and other entities access to real-time or near real-time observations data for decisionmaking to protect human and ecological health and local economies; and

''(I) to assess the combined effects of harmful algal blooms, hypoxia, and stressors such as runoff and infrastructure changes on marine, freshwater, or estuarine ecosystems and living resources;'';

(C) in paragraph (4), by striking ''agencies'' and inserting ''entities, regional coastal observing systems (as such term is defined in section 12303 of the Integrated Coastal and Ocean Observation System Act of 2009 (33 U.S.C. 3602)),'';

(D) in paragraph (6), by inserting ''and communities'' after ''ecosystems'';

(E) in paragraph (8), by inserting ''and Indian tribes'' after ''managers'';

(F) in paragraph (9)(A), by striking '', tribal, and local stakeholders'' and inserting ''and local stakeholders and Indian tribes, Trib-

al organizations, and Native Hawaiian organizations'';

(G) by redesignating paragraphs (3), (4), (5), (6), (7), (8), (9), (10), and (11) as paragraphs (4), (5), (6), (7), (8), (9), (10), (12), and (13), respectively;

(H) by inserting after paragraph (2) the following new paragraph:

''(3) consult with entities that are most dependent on coastal and water resources that may be impacted by marine and freshwater harmful algal blooms and hypoxia, including—

''(A) State and local entities;

''(B) Indian tribes, Tribal organizations, and Native Hawaiian organizations;

''(C) island communities;

''(D) low-population rural communities;

''(E) subsistence communities; and

''(F) fisheries and recreation industries;''; and

(I) by inserting after paragraph (10), as redesignated by subparagraph (G), the following new paragraph:

''(11) expand access to testing for harmful algal bloom toxins, including for subsistence and rec-

reational harvesters, through innovative methods that increase the efficiency and effectiveness of such testing in rural and remote areas;'';

(5) by amending subsection (f) to read as follows:

''(f) COOPERATION; DUPLICATION OF EFFORT.—The Under Secretary shall work cooperatively with and avoid duplication of effort of other agencies on the Task Force and States, Indian tribes, Tribal organizations, Native Hawaiian organizations, and nongovernmental organizations concerned with marine and freshwater issues.''; and

(6) by striking subsection (g), (h), and (i).

(c) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ACTIVITIES.—

(1) IN GENERAL.—Section 603B of the Harmful Algal Blooms and Hypoxia Research and Control Act of 1998 (33 U.S.C. 4003) is amended to read as follows:

''SEC. 603B. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ACTIVITIES.

''(a) IN GENERAL.—The Under Secretary shall carry out the following:

''(1) Carry out response activities for marine, coastal, and Great Lakes harmful algal bloom and hypoxia events.

''(2) Develop and enhance operational harmful algal bloom observing and forecasting programs, including operational observations and forecasting, monitoring, modeling, data management, and information dissemination.

''(3) Develop forecast modeling that includes the effect of hurricanes and other weather events on the resuspension of bioavailable nutrients in sediments and related interactions with harmful algal blooms.

''(4) Enhance communication and coordination among Federal agencies carrying out activities and research relating to marine and freshwater harmful algal bloom and hypoxia.

''(5) Leverage existing resources and expertise available from local research universities and institutions.

''(6) Use cost-effective methods in carrying out this section.

''(b) INTEGRATED COASTAL AND OCEAN OBSERVATION SYSTEM.—The collection of monitoring and observing data under this section shall comply with all data standards and protocols developed pursuant to the Integrated Coastal and Ocean Observation System Act of 2009 (33 U.S.C. 3601 et seq.). Such data shall be made

available through the National Integrated Coastal and Ocean Observation System established under section 12304 of such Act (33 U.S.C. 3603).''.

(2) CLERICAL AMENDMENT.—The table of contents in section 2 of the Coast Guard Authorization Act of 1998 (Public Law 105–383; 112 Stat. 3412; 136 Stat. 1268) is amended by striking the item relating to section 603B and inserting the following new item:

''Sec. 603B. National Oceanic and Atmospheric Administration activities.''.

(d) ENVIRONMENTAL PROTECTION AGENCY ACTIVITIES.—

(1) IN GENERAL.—The Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 is amended by inserting after section 603B (33 U.S.C. 4003) the following new section:

''SEC. 603C. ENVIRONMENTAL PROTECTION AGENCY ACTIVITIES.

''(a) IN GENERAL.—The Administrator shall carry out the following:

''(1) Carry out research on the ecology and human health impacts of freshwater harmful algal blooms and hypoxia events.

''(2) Develop and enhance operational freshwater harmful algal bloom monitoring, observing, and forecasting programs in lakes, rivers, and res-

ervoirs, and coordinate with the National Oceanic and Atmospheric Administration on such programs in the Great Lakes and estuaries (including tributaries thereof), including operational observations and forecasting, monitoring, modeling, data management, and information dissemination, to support event response, prioritization, prevention, adaptation, and mitigation activities.

''(3) Enhance communication and coordination among Federal agencies carrying out freshwater harmful algal bloom and hypoxia activities and research.

''(4) To the greatest extent practicable, leverage existing resources and expertise available from Federal and State partners and local research universities and institutions.

''(5) Utilize cost-effective methods in carrying out this section.

''(b) NONDUPLICATION.—The Administrator shall ensure that activities carried out under subsection (a) focus on new approaches to addressing freshwater harmful algal blooms and are not duplicative of existing research and development programs authorized by this title or any other law.''.

(2) CLERICAL AMENDMENT.—The table of contents in section 2 of the Coast Guard Authorization Act of 1998 (Public Law 105–383; 112 Stat. 3412; 136 Stat. 1268) is amended by inserting after the item relating to section 603B the following new item:

''Sec. 603C. Environmental Protection Agency activities.''.

(e) NATIONAL HARMFUL ALGAL BLOOM AND HYPOXIA OBSERVING NETWORK.—

(1) IN GENERAL.—Section 606 of the Harmful Algal Blooms and Hypoxia Research and Control Act of 1998 (33 U.S.C. 4005) is amended to read as follows:

''SEC. 606. NATIONAL HARMFUL ALGAL BLOOM OBSERVING NETWORK.

''(a) IN GENERAL.—The Under Secretary, acting through the National Centers for Coastal Ocean Science and the Integrated Ocean Observing System of the National Oceanic and Atmospheric Administration, shall integrate Federal, State, regional, and local observing capabilities to establish a national network of observing systems for the monitoring, detection, and forecasting of harmful algal blooms by leveraging the capacity of regional associations of the Integrated Ocean Observing System, including through the incorporation of emerging technologies and new data integration methods.

''(b) COORDINATION AND DATA ASSEMBLY.—In carrying out subsection (a), the Program Office of the Integrated Ocean Observing System shall carry out the following:

''(1) Coordinate with the National Centers for Coastal Ocean Science regarding observations, data integration, and information dissemination.

''(2) Organize, integrate, disseminate, and provide a central architecture to support ecological forecasting of harmful algal blooms.

''(3) Coordinate with the Water Quality Portal to store and serve discrete data related to the monitoring of freshwater, estuarine, and coastal harmful algal blooms.''.

(2) CLERICAL AMENDMENT.—The table of contents in section 2 of the Coast Guard Authorization Act of 1998 (Public Law 105–383; 112 Stat. 3412; 136 Stat. 1268) is amended by striking the item relating to section 606 and inserting the following:

''Sec. 606. National harmful algal bloom observing network.''.

(f) NATIONAL-LEVEL INCUBATOR PROGRAM.—

(1) IN GENERAL.—The Harmful Algal Blooms and Hypoxia Research and Control Act of 1998 is amended by inserting after section 606 (33 U.S.C. 4005) the following new section:

"SEC. 606A. NATIONAL-LEVEL INCUBATOR PROGRAM.

''(a) IN GENERAL.—The Under Secretary, in collaboration with the Administrator and research universities and institutions, shall establish a national-level incubator program (in this section referred to as the 'program') to increase the number of strategies, technologies, and measures available to prevent, mitigate, and control harmful algal blooms.

''(b) FRAMEWORK.—The program shall establish a framework for preliminary assessments of novel strategies, technologies, and measures to prevent, mitigate, and control harmful algal blooms in order to determine the potential effectiveness and scalability of such technologies.

''(c) FUNDING.—The program shall provide merit-based funding, using amounts otherwise available to the Under Secretary for the award of grants, for strategies, technologies, and measures that eliminate or reduce, through biological, chemical, or physical means, the levels of harmful algae and associated toxins resulting from harmful algal blooms.

''(d) DATABASE.—The program shall include a database for cataloging the licensing and permitting requirements, economic costs, feasibility, effectiveness, and scalability of novel and established strategies, technologies, and measures to prevent, mitigate, and control harmful algal blooms.

''(e) PRIORITIZATION.—In carrying out the program, the Under Secretary shall prioritize proposed strategies, technologies, and measures that would, to the maximum extent practicable, accomplish the following:

''(1) Protect key habitats for fish and wildlife.

''(2) Maintain biodiversity.

''(3) Protect public health.

''(4) Protect coastal resources of national, historical, and cultural significance.

''(5) Benefit low-income communities, Indian tribes, and rural communities.''.

(2) CLERICAL AMENDMENT.—The table of contents in section 2 of the Coast Guard Authorization Act of 1998 (Public Law 105–383; 112 Stat. 3412; 136 Stat. 1268) is amended by inserting after the item relating to section 606 the following new item:

''Sec. 606A. National-level incubator program.''.

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

(1) in paragraph (1), by striking ''means the comprehensive research plan and action strategy established under section 603B'' and inserting ''means the action strategy for harmful algal blooms in the United States most recently submitted under section 603(c)'';

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

''(3) HARMFUL ALGAL BLOOM.—The term 'harmful algal bloom' means a high concentration of marine or freshwater algae (including diatoms), macroalgae (including Sargassum), or cyanobacteria resulting in nuisance conditions or harmful impacts on marine and freshwater ecosystems, subsistence resources, communities, or human health through the production of toxic compounds or other biological, chemical, or physical impacts of the bloom.'';

(3) by striking paragraph (9);

(4) by redesignating paragraphs (4), (5), (6), (7), and (8) as paragraphs (5), (8), (9), (11), and (13), respectively;

(5) by inserting after paragraph (3) the following new paragraph:

''(4) HARMFUL ALGAL BLOOM AND HYPOXIA EVENT.—The term 'harmful algal bloom and hypoxia event' means the occurrence of a harmful algal bloom or hypoxia as a result of a natural, anthropogenic, or undetermined cause.'';

(6) in paragraph (5), as redesignated by paragraph (4)—

(A) by striking ''aquatic'' and inserting ''marine or freshwater''; and

(B) by striking ''resident'' and inserting ''marine or freshwater'';

(7) by inserting after paragraph (5), as redesignated by paragraph (4), the following new paragraphs:

''(6) INDIAN TRIBE.—The term 'Indian tribe' has the meaning given such term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304).

''(7) NATIVE HAWAIIAN ORGANIZATION.—The term 'Native Hawaiian organization' has the meaning given such term in section 6207 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7517) and includes the Department of Hawaiian Home Lands and the Office of Hawaiian Affairs.'';

(8) by inserting after paragraph (9), as redesignated by paragraph (4), the following new paragraph:

''(10) SUBSISTENCE USE.—The term 'subsistence use' means the customary and traditional use of fish, wildlife, or other freshwater, coastal, or marine resources by any individual or community to

meet personal or family needs, including essential economic, nutritional, or cultural applications.''; and

(9) by inserting after paragraph (11), as redesignated by paragraph (4), the following new paragraph:

''(12) TRIBAL ORGANIZATION.—The term 'Tribal organization' has the meaning given such term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304).''.

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

(1) by amending subsection (a) to read as follows:

''(a) IN GENERAL.—There is authorized to be appropriated to carry out this title, for each of fiscal years 2026 through 2030, the following:

''(1) $19,500,000 to the Under Secretary.

''(2) $8,000,000 to the Administrator.''; and

(2) by adding at the end the following new subsection:

''(c) TRANSFER AUTHORITY.—As specifically provided in advance in appropriations Acts, the Under Secretary or the Administrator may transfer funds made available to carry out this title to the head of any Federal

department or agency, with the concurrence of such head, to carry out, as appropriate, relevant provisions of this title and section 9(g) of the National Integrated Drought Information System Reauthorization Act of 2018 (33 U.S.C. 4010).''.

SEC. 603. OTHER HARMFUL ALGAL BLOOM MATTERS.

(a) IN GENERAL.—Section 9(g) of the National Integrated Drought Information System Reauthorization Act of 2018 (33 U.S.C. 4010) is amended—

(1) in paragraph (1)—

(A) in subparagraph (B), by adding at the end the following new sentence: ''The appropriate Federal official may waive the non-Federal share requirements of the preceding sentence if such official determines no reasonable means are available through which the recipient of the Federal share is able to satisfy the non-Federal share requirement.''; and

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

''(D) CONTRACT, COOPERATIVE AGREEMENT, AND GRANT AUTHORITY.—The appropriate Federal official may enter into contracts, cooperative agreements, and grants with States, Indian Tribes, Tribal organizations, Native Ha-

waiian organizations, local governments, or other entities to pay for or reimburse costs incurred by such entities for the purposes of supporting the determination of, and assessing the environmental, economic, social, subsistence use, and public health effects of, a harmful algal bloom or hypoxia event of national significance.'';

(2) in paragraph (2)—

(A) in subparagraph (A), by inserting ''a leadership official of an affected Indian Tribe, the executive official of the District of Columbia, or the executive official of an affected territory or possession of the United States,'' after ''State,''; and

(B) in subparagraph (B), by striking ''consider'' and all that follows through ''boundary.'' and inserting ''consider factors such as the following:

''(i) The risk to public health and the potential severity of the detrimental environmental effects of the harmful algal bloom or hypoxia event, as indicated by any of the following:

''(I) Data on shellfish or water quality obtained through sampling programs, including baseline data, and regulatory or advisory thresholds established to explain management actions related to the event.

''(II) Toxin levels in fish, marine mammals, seabirds, shellfish, or water during the event.

''(III) Toxic aerosols produced during the event, including potential human exposures to toxic aerosols.

''(IV) Reports of human or animal illnesses or mortalities during the event.

''(V) Any closures of fishing or shellfish harvesting locations or recreational public waters, including beaches, during the event.

''(VI) The duration and spatial extent of the event.

''(VII) Impacts to habitats or ecosystems associated with the event.

''(ii) The potential economic, social, and subsistence impacts associated with

the harmful algal bloom or hypoxia event, including to fisheries and aquaculture, recreation and tourism, monitoring and management, social or cultural resource use, and event response activities, assessed in comparison with historical data from when a State or region did not experience such an event, as possible, as indicated by any of the following:

"(I) Increases in public health expenditures.

"(II) Losses to commercial fisheries and aquaculture industries, recreation and tourism, real estate, and other impacted industries or businesses.

"(III) Increases in monitoring and management expenditures, including costs incurred for event response and clean-up (such as for beach clean-up following an influx of biomass or a fish-kill) by public or private sectors.

"(IV) Impacts to subsistence resources, including nutritional, cul-

tural, and economic effects on subsistence communities.

''(iii) The relative magnitude of the impacts described in clause (ii) in relation to past occurrences of harmful algal bloom or hypoxia events that occur on a recurrent or annual basis.

''(iv) The geographic scope of the harmful algal bloom or hypoxia event, including the potential of the event to affect several municipalities, to affect more than one State, or to cross an international boundary.'';

(3) in paragraph (3), by adding at the end the following new subparagraphs:

''(D) INDIAN TRIBE.—The term 'Indian Tribe' has the meaning given that term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304).

''(E) NATIVE HAWAIIAN ORGANIZATION.—The term 'Native Hawaiian organization' has the meaning given that term in section 6207 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7517) and includes the De-

partment of Hawaiian Home Lands and the Office of Hawaiian Affairs.

"(F) TRIBAL ORGANIZATION.—The term 'Tribal organization' has the meaning given that term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304)."; and

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

"(4) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this subsection $2,000,000 for each of fiscal years 2026 through 2030, to remain available until expended.".

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

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

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

"(e) HARMFUL ALGAL BLOOM TECHNOLOGIES.—In carrying out the demonstration program under subsection (a), the Secretary may enter into agreements with water and irrigation districts located in the focus areas described

in subsections (c) and (d) for the use or sale of any new technologies developed under the program to expedite the removal of harmful algal blooms in such areas.''.

TITLE VII—PREVENTING HEALTH EMERGENCIES AND TEMPERATURE-RELATED ILLNESS AND DEATHS

SEC. 701. SHORT TITLE.

This title may be cited as the ''Preventing Health Emergencies And Temperature-related Illness and Deaths Act of 2025'' or the ''Preventing HEAT Illness and Deaths Act of 2025''.

SEC. 702. DEFINITIONS.

In this title:

(1) EXTREME HEAT.—The term ''extreme heat'' means heat that substantially exceeds local temperature norms in terms of any combination of the following:

(A) Duration.

(B) Intensity.

(C) Season length.

(D) Frequency.

(2) HEAT.—The term ''heat'' means any combination of the atmospheric parameters associated with modulating human thermoregulation, such as

air temperature, humidity, solar exposure, and wind speed.

(3) HEAT EVENT.—The term ''heat event'' means an occurrence of extreme heat of 2 days or more that may have heat-health implications.

(4) HEAT-HEALTH.—The term ''heat-health'' means health effects to humans from heat, during or outside of heat events, including from vulnerability and exposure, or the risk of such effects.

(5) PLANNING.—The term ''planning'' means activities performed across timescales (including days, weeks, months, years, and decades) with scenario-based, probabilistic or deterministic information to identify and take actions to proactively mitigate heat-health risks.

(6) PREPAREDNESS.—The term ''preparedness'' means activities performed across timescales with decision support tools to manage risk in advance of a heat event and increased ambient temperature.

(7) TRIBAL GOVERNMENT.—The term ''Tribal government'' means the recognized governing body of any Indian or Alaska Native tribe, band, nation, pueblo, village, community, component band, or component reservation, individually identified (including parenthetically) in the list published most recently as

of the date of enactment of this Act pursuant to section 104 of the Federally Recognized Indian Tribe List Act of 1994 (25 U.S.C. 5131).

SEC. 703. NATIONAL INTEGRATED HEAT HEALTH INFORMATION SYSTEM INTERAGENCY COMMITTEE.

(a) ESTABLISHMENT OF COMMITTEE.—There is established within the National Oceanic and Atmospheric Administration an interagency committee, to be known as the ''National Integrated Heat Health Information System Interagency Committee'' (in this section referred to as the ''Committee'').

(b) PURPOSE.—The Committee shall coordinate agencies represented on the Committee to execute, as appropriate, activities across such agencies to ensure a united Federal approach to reducing health risks from heat.

(c) MEMBERSHIP.—

(1) IN GENERAL.—In order to carry out and achieve the purpose described in subsection (b), the Committee shall include the following:

(A) The Director of the National Integrated Heat Health Information System.

(B) Not fewer than one representative from each of the following:

(i) From the Department of Commerce, the following:

(I) From the National Oceanic and Atmospheric Administration, the following:

(aa) The National Weather Service.

(bb) The Office of Oceanic and Atmospheric Research.

(cc) The National Environmental Satellite, Data, and Information Service.

(II) The National Institute of Standards and Technology.

(III) The Bureau of the Census.

(ii) From the Department of Health and Human Services, the following:

(I) The Centers for Disease Control and Prevention, including the National Institute for Occupational Safety and Health.

(II) The Office of the Assistant Secretary of Health and Human Services for Preparedness and Response.

(III) The Substance Abuse and Mental Health Services Administration.

(IV) The National Institutes of Health.

(V) The Indian Health Service.

(iii) From the Department of the Interior, the following:

(I) The Bureau of Indian Affairs.

(II) The Bureau of Land Management.

(III) The National Park Service.

(IV) The Office of Hawaiian Relations.

(iv) From the Environmental Protection Agency, the following:

(I) The Office of Air and Radiation, if the Administrator of the Environmental Protection Agency determines appropriate.

(II) The Office of Research and Development, if the Administrator determines appropriate.

(III) The Office of International and Tribal Affairs.

(v) The Federal Emergency Management Agency.

(vi) The Department of Defense.

(vii) The Department of Agriculture.

(viii) The Department of Housing and Urban Development.

(ix) The Department of Transportation.

(x) The Department of Energy.

(xi) The Department of Labor, including the Occupational Safety and Health Administration.

(xii) The Department of Veteran Affairs.

(xiii) The Department of Education.

(xiv) The Department of State.

(xv) The United States Agency for International Development.

(xvi) Such other Federal agencies as the Under Secretary of Commerce for Oceans and Atmosphere considers appropriate.

(2) SELECTION OF REPRESENTATIVES.—The head of an agency specified in paragraph (1)(B) shall, in appointing representatives of the agency to

the Committee, select representatives who have expertise in areas relevant to the responsibilities of the Committee, such as weather prediction, health impacts, behavioral science, public health hazard preparedness and response, or mental health services.

(3) CO-CHAIRS.—

(A) IN GENERAL.—The members of the Committee shall select three individuals from among such members to serve as co-chairs of the Committee, subject to the approval of the Under Secretary of Commerce for Oceans and Atmosphere.

(B) SELECTION.—

(i) INITIAL SELECTION.—Of the co-chairs first selected, one shall be from the National Oceanic and Atmospheric Administration, one shall be from the Department of Health and Human Services, and one shall be from the Federal Emergency Management Agency.

(ii) SUBSEQUENT SELECTION.—Subsequent co-chairs shall be selected from among the members of the Committee, except the National Oceanic and Atmospheric

Administration shall have the opportunity to maintain a co-chair position.

(C) TERMS.—Each co-chair shall serve for a term of not more than five years.

(D) RESPONSIBILITIES OF CO-CHAIRS.—The co-chairs of the Committee shall, in consultation with the Director of the National Integrated Heat Health Information System, carry out the following:

(i) Determine the agenda of the Committee, in consultation with other members of the Committee.

(ii) Direct the work of the Committee.

(iii) Convene meetings of the Committee not less frequently than once each fiscal quarter.

(d) RESPONSIBILITIES OF COMMITTEE.—The Committee shall coordinate an integrated, Federal Government-wide approach to reducing health risks and impacts of heat, including by carrying out the following:

(1) Developing the strategic plan required by subsection (e).

(2) Coordinating across Federal agencies regarding heat-health communication, engagement, research, service delivery, and workforce development.

(3) Building capacity and partnerships with Federal and non-Federal entities.

(e) STRATEGIC PLAN.—

(1) IN GENERAL.—Not later than two years after the date of the enactment of this Act, the Committee shall submit to Congress and make available on a public website a 5-year strategic plan that outlines the goals and projects of the Committee, including how the Committee will improve coordination and integration of interagency Federal capacity and capabilities to address health risks of heat, including the following:

(A) A strategy for improving and coordinating existing Federal data collection and data management, including sharing of data and statistics on heat-related illnesses and mortalities and other impacts to inform heat-related activities.

(B) A strategy for improving and coordinating Federal activities to understand user gaps and needs, conduct research, foster innovative solutions, and provide actionable information and services.

(C) Mechanisms for financing heat planning and preparedness within such agencies as the Committee considers appropriate.

(2) IMPLEMENTATION.—The head of an agency represented on the Committee may implement the portions of the strategic plan required under paragraph (1) that are relevant to such agency.

(3) UPDATES.—Not later than five years after the submission of the strategic plan required five paragraph (1) and every five years thereafter, the Committee shall brief Congress on an update of the plan, which shall include progress made toward goals outlined in the previous plan and new priorities that emerge.

(f) CONSULTATION.—In carrying out the responsibilities of the Committee, the Committee shall consult with relevant—

(1) regional, State, Tribal, and local governments;

(2) international organizations and partners;

(3) research institutions;

(4) nongovernmental organizations and associations;

(5) medical experts with expertise in emergency response; and

(6) environmental health, economic or business development, or other stakeholders.

SEC. 704. NATIONAL INTEGRATED HEAT HEALTH INFORMATION SYSTEM.

(a) ESTABLISHMENT.—The Under Secretary of Commerce for Oceans and Atmosphere shall establish within the National Oceanic and Atmospheric Administration a system, to be known as the ''National Integrated Heat Health Information System'' (NIHHIS) (in this section referred to as the ''System'').

(b) PURPOSE.—The purpose of the System is to reduce heat-related impacts by accomplishing the following:

(1) Improving the delivery of data, information, forecasts, warnings, predictions, and projections related to temperature and extreme heat and related impacts.

(2) Through the Office of Oceanic and Atmospheric Research, developing science-based solutions and tools to improve impact-based decision support services for heat impacts to human life, property, and the United States economy.

(3) Supporting a research program on heat health, in coordination with the agencies represented on the National Integrated Heat Health Information System Interagency Committee.

(c) DATA MANAGEMENT.—

(1) AVAILABILITY.—The data and metadata associated with the System shall be fully and openly available, within the legal right to redistribute, in accordance with chapter 31 of title 44, United States Code (commonly known as the ''Federal Records Act of 1950''), and the Foundations for Evidence-Based Policymaking Act of 2018 (Public Law 115–435;132 Stat. 5529) and the amendments made by such Act, to maximize use of such data to support the goals of the System.

(2) NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION.—

(A) IN GENERAL.—The Under Secretary of Commerce for Oceans and Atmosphere shall manage, maintain, and steward archival data and metadata associated with the System within the National Centers for Environmental Information.

(B) WARNING COORDINATION METEOROLOGIST.—The Under Secretary of Commerce for Oceans and Atmosphere shall designate at least one warning coordination meteorologist, as described in section 405 of the Weather Research and Forecasting Innovation Act of 2017 (15

U.S.C. 8545), at the National Centers for Environmental Information.

SEC. 705. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out sections 703 and 704, including for any administrative costs for the National Integrated Heat Health Information System Interagency Committee and the National Integrated Heat Health Information System, $5,000,000 for each of fiscal years 2026 through 2030.

TITLE VIII—NATIONAL LANDSLIDE PREPAREDNESS ACT REAUTHORIZATION

SEC. 801. SHORT TITLE.

This title may be cited as the ''National Landslide Preparedness Act Reauthorization Act of 2025''.

SEC. 802. CERTAIN DEFINITIONS UNDER FLOOD LEVEL OBSERVATION, OPERATIONS, AND DECISION SUPPORT ACT.

(a) DEFINITIONS.—Section 12(a) of the Flood Level Observation, Operations, and Decision Support Act (15 U.S.C. 9707(a)) is amended—

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

(2) by inserting before paragraph (4) (as so redesignated) the following new paragraphs:

''(1) ATMOSPHERIC RIVER.—The term 'atmospheric river' means a transient corridor of strong water vapor in the atmosphere that—

''(A) produces significant quantities of rain or snow; and

''(B) may be primarily beneficial to the water supply or hazardous due to flooding.

''(2) ATMOSPHERIC RIVER FLOODING EVENT.—The term 'atmospheric river flooding event' means an atmospheric river that—

''(A) results in flooding of rivers and streams or other hazards to human life, property, or the economy; and

''(B) is of particular concern to human health, property, and the economy, as determined by the Secretary of Commerce.

''(3) EXTREME PRECIPITATION EVENT.—The term 'extreme precipitation event' means precipitation quantities exceeding the 5-year annual recurrence interval for a specific location.''.

(b) REQUIREMENTS.—Section 12(d)(1) of the Flood Level Observation, Operations, and Decision Support Act (15 U.S.C. 9707(d)(1)) is amended by inserting '', such

as precipitation resulting from hurricanes, atmospheric river flooding events, and extreme precipitation events'' before the period at the end.

SEC. 803. REAUTHORIZATION OF NATIONAL LANDSLIDE PREPAREDNESS ACT.

(a) DEFINITIONS.—Section 2 of the National Landslide Preparedness Act (43 U.S.C. 3101) is amended—

(1) by redesignating paragraphs (4) through (11) as paragraphs (7), (8), (10), (11), (13), (14), (15), and (16), respectively;

(2) by inserting after paragraph (3) the following new paragraphs:

''(4) ATMOSPHERIC RIVER.—The term 'atmospheric river' has the meaning given the term in section 12(a) of the Flood Level Observation, Operations, and Decision Support Act (15 U.S.C. 9707(a)).

''(5) ATMOSPHERIC RIVER FLOODING EVENT.—The term 'atmospheric river flooding event' has the meaning given the term in section 12(a) of the Flood Level Observation, Operations, and Decision Support Act (15 U.S.C. 9707(a)).

''(6) EXTREME PRECIPITATION EVENT.—The term 'extreme precipitation event' has the meaning given the term in section 12(a) of the Flood Level

Observation, Operations, and Decision Support Act (15 U.S.C. 9707(a)).'';

(3) by inserting after paragraph (8) (as so redesignated) the following new paragraph:

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

(4) by inserting after paragraph (11) (as so redesignated) the following new paragraph:

''(12) NATIVE HAWAIIAN ORGANIZATION.—The term 'Native Hawaiian organization' has the meaning given the term in section 6207 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7517), except that the term includes the Department of Hawaiian Home Lands and the Office of Hawaiian Affairs.''; and

(5) by adding at the end the following new paragraph:

''(17) TRIBAL ORGANIZATION.—The term 'Tribal organization' has the meaning given the term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304).''.

(b) NATIONAL LANDSLIDE HAZARDS REDUCTION PROGRAM.—

(1) ESTABLISHMENT.—Section 3(a)(3) of the National Landslide Preparedness Act (43 U.S.C. 3102(a)(3)) is amended by striking ''protect'' and inserting ''contribute to protecting''.

(2) PROGRAM ACTIVITIES.—Section 3(b)(1)(C)(ii) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(1)(C)(ii)) is amended, in the matter preceding subclause (I), by striking ''implement'' and inserting ''disseminate''.

(3) NATIONAL STRATEGY.—Section 3(b)(2) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(2)) is amended—

(A) by redesignating subparagraphs (A) through (C) as clauses (i) through (iii), respectively, and indenting appropriately;

(B) in the matter preceding clause (i) (as so redesignated), by striking ''Not later than'' and inserting the following:

''(A) IN GENERAL.—Not later than''; and

(C) by adding at the end the following new subparagraph:

''(B) ASSESSMENT.—For purposes of the first national strategy published after the date

of the enactment of the National Landslide Preparedness Act Reauthorization Act of 2025 under subparagraph (A), the Secretary, in consultation with the Secretary of Commerce, shall include an assessment of the risks that atmospheric river flooding events and extreme precipitation events pose to the safety of life and property in the United States with respect to landslide hazards.''.

(4) NATIONAL LANDSLIDE HAZARDS DATABASE.—Section 3(b)(3) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(3)) is amended—

(A) by redesignating subparagraphs (C) and (D) as subparagraphs (D) and (E), respectively; and

(B) by inserting after subparagraph (B) the following new subparagraph:

''(C) the identification of areas in need of additional hazard risk assessment, including areas that may be at risk due to—

''(i) hydrology or changes in hydrology that may include erosion, drought, or other characteristics that could impact landslide risk;

''(ii) atmospheric river flooding events and extreme precipitation events, as identified by the Secretary of Commerce and the Secretary;

''(iii) geologic activity, such as volcanic eruptions, earthquakes, or tsunamis; or

''(iv) data-poor areas or hazards with poor monitoring that could contribute to increased landslide risk;''.

(5) LANDSLIDE HAZARD AND RISK PREPAREDNESS FOR COMMUNITIES.—Section 3(b)(4) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(4)) is amended—

(A) in the matter preceding subparagraph (A), by inserting ''Native Hawaiian organizations and other stakeholders, as appropriate,'' before ''and Indian tribes'';

(B) in subparagraph (A)—

(i) in the matter preceding clause (i), by striking ''local, and Tribal governments and decisionmakers'' and inserting ''and local governments, Indian tribes, Tribal organizations, Native Hawaiian organizations, and other decisionmakers'';

(ii) by amending clause (iii) to read as follows:

''(iii) health and safety with respect to landslides;'';

(iii) by redesignating clause (iv) as clause (v); and

(iv) by inserting after clause (iii) the following new clause:

''(iv) reducing losses from landslides, including the threats caused by atmospheric rivers and other extreme precipitation events; and''; and

(C) in subparagraph (B)—

(i) in clause (i), by striking ''local, and Tribal officials'' and inserting ''and local officials, Indian tribes, Tribal organizations, and Native Hawaiian organizations''; and

(ii) in clause (ii), by striking ''local, and Tribal emergency managers'' and inserting ''and local emergency managers and emergency managers of Indian tribes, Tribal organizations, and Native Hawaiian organizations''.

(6) DEBRIS FLOW EARLY WARNING SYSTEM.—Section 3(b)(5) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(5)) is amended—

(A) in subparagraph (B), by striking ''State, territorial, local, and Tribal governments'' and inserting ''State, territorial, and local governments, Indian tribes, Tribal organizations, and Native Hawaiian organizations'';

(B) by redesignating subparagraphs (A) through (C) as clauses (i) through (iii), respectively, and indenting appropriately;

(C) in the matter preceding clause (i) (as so redesignated), by striking ''In carrying out'' and inserting the following:

''(A) IN GENERAL.—In carrying out''; and

(D) by adding at the end the following new subparagraph:

''(B) CONSULTATION.—In carrying out subparagraph (A), the Secretary may consult with an institution of higher education described in subsection (d)(2)(B)(iv) and other stakeholders to establish and support emergency response procedures, as appropriate.''.

(7) EMERGENCY RESPONSE ACTIVITIES.—Section 3(b)(6) of the National Landslide Preparedness Act (43 U.S.C. 3102(b)(6)) is amended—

(A) by redesignating subparagraphs (A) through (C) as clauses (i) through (iii), respectively, and indenting appropriately;

(B) in the matter preceding clause (i) (as so redesignated), by striking ''In carrying'' and inserting the following:

''(A) IN GENERAL.—In carrying'';

(C) in subparagraph (A) (as so designated)—

(i) in the matter preceding clause (i) (as so redesignated), by inserting ''Native Hawaiian organizations,'' before ''and Indian tribes'';

(ii) in clause (ii) (as so redesignated), by striking ''and'' at the end;

(iii) in clause (iii) (as so redesignated), by striking the period at the end and inserting ''; and''; and

(iv) by adding at the end the following new clause:

''(iv) to improve real-time risk management during landslide events, including

with respect to landslide events caused by—

"(I) hydrology or changes in hydrology that may include erosion, drought, or other characteristics that could impact landslide risk;

"(II) atmospheric river flooding events and extreme precipitation events, as identified by the Secretary of Commerce and the Secretary;

"(III) geologic activity, such as volcanic eruptions, earthquakes, or tsunamis;

"(IV) data-poor areas or hazards with poor monitoring that could contribute to increased landslide risk; or

"(V) thawing permafrost and glacial retreat causing destabilization of slopes."; and

(D) by adding at the end the following new subparagraph:

"(B) CONSULTATION.—In carrying out subparagraph (A), the Secretary may consult with an institution of higher education de-

scribed in subsection (d)(2)(B)(iv) and the private sector.''.

(8) INTERAGENCY COORDINATING COMMITTEE ON LANDSLIDE HAZARDS.—Section 3(c)(2) of the National Landslide Preparedness Act (43 U.S.C. 3102(c)(2)) is amended by adding at the end the following new subparagraph:

''(J) The Administrator of the National Aeronautics and Space Administration.''.

(9) ADVISORY COMMITTEE.—Section 3(d)(2)(B) of the National Landslide Preparedness Act (43 U.S.C. 3102(d)(2)(B)) is amended—

(A) in clause (iii), by striking ''geological''; and

(B) in clause (vi), by striking ''local, and Tribal emergency management agencies'' and inserting ''and local emergency management agencies and emergency management agencies of Indian tribes and Native Hawaiian organizations''.

(10) REGIONAL PARTNERSHIPS.—Section 3 of the National Landslide Preparedness Act (43 U.S.C. 3102) is amended—

(A) by redesignating subsections (e) through (i) as subsections (f) through (j), respectively; and

(B) by inserting after subsection (d) the following new subsection:

''(e) REGIONAL PARTNERSHIPS.—

''(1) IN GENERAL.—As soon as practicable after the date of enactment of the National Landslide Preparedness Act Reauthorization Act of 2025, the Secretary shall establish in the State of Alaska and other regions, as the Secretary determines appropriate, a regional partnership with an eligible partner described in paragraph (2).

''(2) ELIGIBLE PARTNERS.—An organization or institution of higher education with expertise in landslide mapping, research, and monitoring shall be eligible for a regional partnership under paragraph (1).

''(3) PURPOSES AND DUTIES.—A regional partnership established under paragraph (1) shall accomplish the following:

''(A) Allow the Secretary to leverage applicable expertise in regional organizations.

''(B) Coordinate long-term landslide research specific to the applicable region.

''(C) Align interagency landslide monitoring efforts.''.

(11) GRANT PROGRAMS.—Section 3 of the National Landslide Preparedness Act (43 U.S.C. 3102) is amended, in paragraph (1) of subsection (f) (as so redesignated)—

(A) in subparagraph (A)(i), by striking ''local, and Tribal governments to research, map, assess'' and inserting ''and local governments, Indian tribes, Tribal organizations, and Native Hawaiian organizations to research, map, assess, monitor'';

(B) in subparagraph (B)—

(i) in clause (i), by inserting ''institutions of higher education described in subsection (d)(2)(B)(iv),'' before ''and Indian tribes''; and

(ii) in clause (ii)—

(I) by redesignating subclauses (II) through (IV) as subclauses (III) through (V), respectively; and

(II) by inserting after subclause (I) the following new subclause:

"(II) in regions that have recently experienced loss of life due to landslides;"; and

(C) in subparagraph (C)—

(i) in clause (i), by inserting "awarded" after "grants"; and

(ii) in clause (ii), by striking "made" and inserting "or other accomplishments resulting".

(12) SIGNIFICANT EVENTS.—Section 3 of the National Landslide Preparedness Act (43 U.S.C. 3102) is amended, in subsection (h)(3) (as so redesignated), by striking "local, and Tribal partners" and inserting "and local partners, Indian tribes, Tribal organizations, and Native Hawaiian organizations".

(13) FUNDING.—Section 3 of the National Landslide Preparedness Act (43 U.S.C. 3102) is amended, in subsection (i) (as so redesignated)—

(A) in the matter preceding paragraph (1), by striking "2024" and inserting "2030"; and

(B) in paragraph (1), by striking "there is authorized to be appropriated to the United States Geological Survey, $25,000,000 to carry out this section" and inserting "from amounts

appropriated or otherwise made available to the United States Geological Survey, $35,000,000 shall be used to carry out this section, of which not less than $10,000,000 shall be used for the purchase, deployment, and repair of landslide early warning systems in high risk areas''.

(c) 3D ELEVATION PROGRAM.—

(1) ESTABLISHMENT.—Section 5(a) of the National Landslide Preparedness Act (43 U.S.C. 3104(a)) is amended—

(A) in paragraph (1)(A), by inserting ''and derivative'' after ''3D elevation''; and

(B) in paragraph (2)(B)(i), by inserting '', process, and integrate'' after ''acquire''.

(2) 3D ELEVATION FEDERAL INTERAGENCY COORDINATING COMMITTEE.—Section 5(b)(3) of the National Landslide Preparedness Act (43 U.S.C. 3104(b)(3)) is amended—

(A) by redesignating subparagraphs (D) and (E) as subparagraphs (E) and (F), respectively; and

(B) by inserting after subparagraph (C) the following new subparagraph:

''(D) the 3D Hydrography Program Working Group;''.

(3) GRANTS AND COOPERATIVE AGREEMENTS.—Section 5(d)(3) of the National Landslide Preparedness Act (43 U.S.C. 3104(d)(3)) is amended by striking ''publically'' and inserting ''publicly''.

(4) FUNDING.—Section 5(e) of the National Landslide Preparedness Act (43 U.S.C. 3104(e)) is amended by striking ''2024'' and inserting ''2030''.

TITLE IX—OTHER AUTHORITIES

SEC. 901. METEOROLOGICAL OBSERVATIONS IN THE ARCTIC REGION.

(a) ESTABLISHMENT OF METEOROLOGICAL OBSERVATION STATIONS IN THE ARCTIC REGION.—The Under Secretary may take such action as may be necessary in the development of an international basic meteorological observation network in the Arctic region of the Western Hemisphere, including the establishment, operation, and maintenance of observation stations in cooperation with the following:

(1) The Department of State and other Federal agencies.

(2) The meteorological services and space-based assets of the United States and foreign countries.

(3) The commercial sector.

(4) Local communities and Indian Tribes in the Arctic region.

(5) Persons engaged in air and marine commerce.

(b) APPOINTMENT AND COMPENSATION OF EMPLOYEES FOR CONDUCT OF METEOROLOGICAL INVESTIGATIONS IN ARCTIC REGION.—The Secretary of Commerce, acting through the Under Secretary, may carry out the following:

(1) Appoint employees for the conduct of meteorological investigations in the Arctic region without regard to the civil service laws and fix their compensation without regard to chapter 51 and subchapter III of chapter 53 of title 5, United States Code, and sections 5542, 5543, 5545, and 5546 of such title, at base rates not to exceed the maximum scheduled rate for GS–12 of the General Schedule under section 5332 of such title.

(2) Grant extra compensation to employees of other Federal agencies for taking and transmitting meteorological observations without regard to section 5533 of title 5, United States Code.

(c) TRANSFER FROM OTHER GOVERNMENT DEPARTMENTS OF SURPLUS EQUIPMENT AND SUPPLIES FOR ARCTIC STATIONS.—Subject to approval of the President, and without charge to the National Oceanic and Atmospheric Administration, the Secretary of the Army, the Sec-

retary of the Air Force, and the Secretary of the Navy may transfer to the National Weather Service equipment and supplies that are surplus to the needs of their respective Departments and necessary for the establishment, maintenance, and operation of Arctic observation stations in the United States.

(d) SENSE OF CONGRESS.—It is the sense of Congress that observations in polar regions and remote areas are important for weather and environmental monitoring.

(e) REPEAL.—Section 1 of the Act of February 12, 1946 (60 Stat. 4, chapter 4; 15 U.S.C. 313a), is hereby repealed.

SEC. 902. UNFUNDED PRIORITIES LIST, REPORTS, AND PLANS.

(a) DEFINITIONS.—In this section:

(1) ADMINISTRATION.—The term ''Administration'' means the National Oceanic and Atmospheric Administration.

(2) ADMINISTRATOR.—The term ''Administrator'' means the Administrator of the National Oceanic and Atmospheric Administration.

(3) APPROPRIATE COMMITTEES OF CONGRESS.—The term ''appropriate committees of Congress'' means the following:

(A) The Committee on Commerce, Science, and Transportation of the Senate.

(B) The Committee on Appropriations of the Senate.

(C) The Committee on Natural Resources of the House of Representatives.

(D) The Committee on Science, Space, and Technology of the House of Representatives.

(E) The Committee on Appropriations of the House of Representatives.

(4) CAPITAL BUDGETARY LINE ITEM.—The term ''capital budgetary line item'' means a line item in the budget justification materials submitted to Congress in support of the budget of the President for a fiscal year pursuant to section 1105 of title 31, United States Code, for any aircraft or vessel for the Administration valued at more than $3,000,000.

(5) INFRASTRUCTURE AND ASSETS.—The term ''infrastructure and assets'' means the following:

(A) Repair and construction of infrastructure, facilities, and laboratories.

(B) Instrumentation.

(C) Resources for data storage and analysis, including options for cloud-based and supercomputing services.

(D) With respect to the Office of Marine and Aviation Operations, aircraft, vessels, and uncrewed systems, associated facility construction and repair needs, instrumentation, and requirements to operate new and existing assets to reliably meet the mission needs of the Administration.

(6) UNFUNDED PRIORITY.—The term ''unfunded priority'' means a program or mission requirement that—

(A) has not been selected for funding in the applicable proposed budget;

(B) is necessary to fulfill a statutory or mission requirement; and

(C) the Administrator would have recommended for inclusion in the applicable proposed budget had additional resources been available or had the requirement emerged before the budget was submitted.

(b) UNFUNDED PRIORITIES LIST.—

(1) IN GENERAL.—Not later than 15 days after the date on which the President submits to Congress

the budget of the President for a fiscal year pursuant to section 1105 of title 31, United States Code, the Administrator, in consultation with the Assistant Administrator for each line office of the Administration, shall submit to the appropriate committees of Congress a report that includes a list of unfunded priorities of the Administration.

(2) INCLUSIONS.—The list required by paragraph (1) shall include unfunded priorities related to the needs of the Administration—

(A) to meet statutory and mission requirements to—

(i) protect human life, property, and the economy from the impacts of weather, water, and space weather;

(ii) manage the Nation's fisheries and ocean, coastal, and Great Lakes resources; and

(iii) manage, steward, and make improvements to data storage, accessibility, interoperability, and utilization;

(B) with respect to infrastructure and assets to satisfy statutory and mission requirements, including—

(i) needs with respect to—

(I) repair and construction of infrastructure, facilities, and laboratories;

(II) scientific support equipment and instrumentation; and

(III) resources for data storage and analysis, including options for cloud-based and supercomputing services; and

(ii) with respect to the Office of Marine and Aviation Operations, in coordination with the Assistant Administrator for Marine and Aviation Operations, needs with respect to aircraft and vessels, associated facility construction and repair needs, and resources required to operate new and existing assets;

(C) with respect to operational shortfalls that compromise the ability of the Administration to satisfy the statutory and mission requirements described in subparagraph (A), including by compromising the ability of the Administration to satisfy such requirements in a timely manner;

(D) with respect to mitigating fishery disasters, including in accordance with the requirements under the heading ''FISHERIES DISASTER ASSISTANCE'' in title II of the Disaster Relief Supplemental Appropriations Act, 2023 (division N of Public Law 117–328); and

(E) with respect to transitioning successful experimental programs under the Office of Oceanic and Atmospheric Research as of the date of the enactment of this Act into an operational capacity under another office of the Administration.

(3) PRIORITIZATION.—The list required by paragraph (1) shall—

(A) present the unfunded priorities of the Administration in order from highest to lowest priority, as determined by the Administrator; and

(B) with respect to each unfunded priority, include—

(i) a brief description of the unfunded priority and its relationship to the statutory and mission requirements of the Administration;

(ii) an estimate of the funding level required; and

(iii) an assessment of the status of the design or acquisition program, if applicable.

(c) CAPITAL INVESTMENT PLAN.—

(1) IN GENERAL.—Not later than 60 days after the date on which the President submits to Congress the budget of the President for a fiscal year pursuant to section 1105 of title 31, United States Code, the Administrator, in consultation with the Assistant Administrator for Marine and Aviation Operations and the Assistant Administrators for the line offices of the Administration, as appropriate, shall submit to the appropriate committees of Congress a future-years capital investment plan.

(2) INCLUSIONS.—The plan required by paragraph (1) shall include the following:

(A) The fleet replacement and modernization plan required by section 604 of the NOAA Fleet Modernization Act (33 U.S.C. 891b).

(B) The NOAA Aircraft Recapitalization Plan and any plan developed to carry out section 11708 of the Don Young Coast Guard Authorization Act of 2022 (33 U.S.C. note prec.

851; enacted as part of subtitle A of title CXVII of division K of the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023; Public Law 117–263).

(C) Any other plan the Administrator considers appropriate.

(3) ELEMENTS.—The plan required by paragraph (1) shall identify, for each capital budgetary line item, the following:

(A) The proposed funding level included in the applicable proposed budget.

(B) The total estimated cost of completion.

(C) Projected funding levels for each fiscal year for the next five fiscal years or until completion, whichever is earlier.

(D) An estimated completion date at the projected funding levels.

(E) Changes, if any, in the total estimated cost of completion or estimated completion date from previous future-years capital investment plans submitted under this subsection.

SEC. 903. MISCELLANEOUS AUTHORITIES.

(a) TECHNICAL ASSISTANCE IN THE PACIFIC.—

(1) IN GENERAL.—Subject to the availability of appropriations, and at the discretion of the Sec-

retary of Commerce, in consultation with the Secretary of State, the Under Secretary may provide to Pacific Island parties technical assistance and services in line with the mission of the National Oceanic and Atmospheric Administration.

(2) REGIONAL CAPACITY.—

(A) USE OF EXISTING PROGRAMS, OFFICES, AND SITES.—To implement this subsection, the Under Secretary shall primarily utilize existing programs, offices, and sites of the National Oceanic and Atmospheric Administration in the Pacific Islands region.

(B) COOPERATIVE INSTITUTE.—In order to further augment existing regional capacity in the Pacific Islands region, the Under Secretary may consider the formation of a cooperative institute to focus and advise on the unique needs of that region.

(3) PACIFIC ISLAND PARTIES DEFINED.—In this subsection, the term ''Pacific Island parties'' means the following:

(A) The Trust Territories of the Pacific Islands.

(B) The Republic of Palau, the Republic of the Marshall Islands, and the Federated States

of Micronesia, which have each entered into a Compact of Free Association with the United States.

(C) Such other parties as the Under Secretary considers appropriate.

(b) STATE ASSISTANCE.—The Under Secretary may provide technical assistance, data, and operational products or services in support of State governments, or entities and institutions partnering or collaborating with State governments, in the voluntary production of State climate or weather assessments.

(c) INTERNATIONAL COLLABORATION.—

(1) IN GENERAL.—The Under Secretary, acting through the Director of the National Weather Service, may establish partnerships and other mutually beneficial relationships with national and regional weather services around the world to support the co-development and deployment of weather and climate observations and instrumentation.

(2) EXISTING AGREEMENTS AND PARTNERSHIPS.—Partnerships and other relationships established in accordance with paragraph (1), including those provided by the international desks of the National Centers for Environmental Prediction, shall build upon existing agreements and partnerships

with the Department of State and the World Meteorological Organization.

(d) APP- OR WEB-BASED TOOLS.—The Under Secretary may, in alignment with the 21st Century Integrated Digital Experience Act (Public Law 115–336; 44 U.S.C. 3501 note) and the memorandum of the Director of the Office of Management and Budget dated September 22, 2023, and entitled ''Delivering a Digital-First Public Experience'' (M–23–22), implement mobile applications, modern application programming interfaces, or web-based tools to increase the utility of and access to data, services, and products of the National Oceanic and Atmospheric Administration.

(e) BRIEFING.—Not later than one year after the date of the enactment of this Act, the Under Secretary shall provide the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a briefing on the number and time commitment of intra-agency and interagency meetings, councils, boards, and summits attended by each line office Assistant Administrator and Deputy Administrator of the National Oceanic and Atmospheric Administration.

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