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HOUSE OF REPRESENTATIVES
REPORT
117–304

PROVIDING RESEARCH AND ESTIMATES OF CHANGES IN PRECIPITATION ACT

MAY 3, 2022.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Ms. EDDIE BERNICE JOHNSON of Texas, from the Committee on Science, Space, and Technology, submitted the following

R E P O R T

[To accompany H.R. 1437]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 1437) to amend the Weather Research and Forecasting Innovation Act of 2017 to direct the National Oceanic and Atmospheric Administration to provide comprehensive and regularly updated Federal precipitation information, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

CONTENTS

29–006

I. AMENDMENT

The amendment is as follows:
Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Providing Research and Estimates of Changes In Precipitation Act" or the "PRECIP Act".

SEC. 2. AMENDMENT TO THE WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2017.

(a) IN GENERAL.—The Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8521) is amended by adding at the end the following:

"TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

"SEC. 601. STUDY ON PRECIPITATION ESTIMATION.

"(a) IN GENERAL.—Not later than 90 days after the date of enactment of the PRECIP Act, the Administrator, in consultation with other Federal agencies as appropriate, shall seek to enter an agreement with the National Academies—

"(1) to conduct a study on the state of practice and research needs for precipitation estimation, including probable maximum precipitation estimation; and

"(2) to submit, not later than 24 months after the date on which such agreement is finalized, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and make publicly available on a website, a report on the results of the study under paragraph (1).

"(b) STUDY.—The report under subsection (a) shall include the following:

"(1) An examination of the current state of practice for precipitation estimation at scales appropriate for decisionmaker needs, and rationale for further evolution of this field.

"(2) An evaluation of best practices for precipitation estimation that are based on the best-available science, include assumptions of non-stationarity, and can be utilized by the user community.

"(3) A framework for—

"(A) the development of a National Guidance Document for estimating extreme precipitation in future conditions; and

"(B) evaluation of the strengths and challenges of the full spectrum of approaches, including for probable maximum precipitation studies.

"(4) A description of existing research needs in the field of precipitation estimation in order to modernize current methodologies and incorporate assumptions of non-stationarity.

"(5) A description of in-situ, airborne, and space-based observation requirements, that could enhance precipitation estimation and development of models, including an examination of the use of geographic information systems and geospatial technology for integration, analysis, and visualization of precipitation data.

"(6) A recommended plan for a Federal research and development program, including specifications for costs, timeframes, and responsible agencies for addressing identified research needs.

"(7) An analysis of the respective roles in precipitation estimation of various Federal agencies, academia, State, tribal, territorial, and local governments, and other public and private stakeholders.

"(8) Recommendations for data management to promote long-term needs such as enabling retrospective analyses and data discoverability, interoperability, and reuse.

"(9) Recommendations for how data and services from the entire enterprise can be best leveraged by the Federal Government.

"(10) A description of non-Federal precipitation data, its accessibility by the Federal Government, and ways for National Oceanic and Atmospheric Administration to improve or expand such datasets.

"(11) Such other topics as the Administrator or National Academies consider appropriate.

"(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized $1,500,000 to the National Oceanic and Atmospheric Administration to carry out this study.

"SEC. 602. IMPROVING PRECIPITATION FREQUENCY ESTIMATES.

"(a) IN GENERAL.—The Administrator shall—

"(1) not later than 5 years after the date of enactment of this title and not less frequently than every 5 years thereafter, update precipitation frequency estimates for the United States, such that each update includes at least one precipitation frequency atlas that incorporates assumptions of non-stationarity;

"(2) develop products targeted at users of this data in support of the mission of the National Oceanic and Atmospheric Administration;

"(3) make publicly available, in a searchable, interoperable format, all precipitation frequency estimate studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and that are deemed to be at an appropriate stage of development on an internet website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all precipitation frequency estimate data, products, and supporting documentation and metadata are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section $3,500,000 for each of fiscal years 2022 through 2030.

"SEC. 603. IMPROVING PROBABLE MAXIMUM PRECIPITATION ESTIMATES.

"(a) IN GENERAL.—Not later than 90 days after the date on which the National Academies makes public the report under section 601, the Administrator, in consideration of the report recommendations, shall consult with relevant partners, including users of the data, on the development of a plan to—

"(1) not later than 6 years after the completion of the National Academies report under section 601 and not less than every 10 years thereafter, update probable maximum precipitation estimates for the United States, such that each update includes estimates that incorporate assumptions of non-stationarity;

"(2) coordinate with partners to conduct research in the field of extreme precipitation estimation, in accordance with the research needs identified by the National Academies report under section 601;

"(3) make publicly available, in a searchable, interoperable format, all probable maximum precipitation studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and deemed to be at an appropriate state of development on an internet website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all probable maximum precipitation estimate data, products, and supporting documentation and metadata developed by the National Oceanic and Atmospheric Administration are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) NATIONAL GUIDANCE DOCUMENT FOR THE DEVELOPMENT OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES.—The Administrator, in collaboration with Federal agencies, State, territorial, tribal and local governments, academia and other partners the Administrator deems appropriate, shall develop a National Guidance Document that—

"(1) provides best practices that can be followed by Federal and State regulatory agencies, private meteorological consultants, and other users that perform probable maximum precipitation studies;

"(2) considers the recommendations provided in the National Academies study in section 601;

"(3) facilitates review of probable maximum precipitation studies by regulatory agencies;

"(4) provides confidence in regional and site-specific probable maximum precipitation estimates; and

"(5) includes such other topics as the Administrator deems appropriate.

"(c) PUBLICATION.—Not later than 2 years after the date on which the National Academies makes public the report under section 601, the Administrator shall make publicly available the National Guidance Document under subsection (b) on an internet website of the National Oceanic and Atmospheric Administration.

"(d) UPDATES.—The Administrator shall update the National Guidance Document not less than once every 10 years after the publication of the National Guidance Document under subsection (c) and publish such updates in accordance with such subsection.

"(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section:

"(1) $13,000,000 for fiscal year 2022.
"(2) $14,000,000 for fiscal year 2023.
"(3) $14,000,000 for fiscal year 2024.
"(4) $2,000,000 for fiscal year 2025.
"(5) $2,000,000 for fiscal year 2026.
"(6) $2,000,000 for fiscal year 2027.

"SEC. 604. DEFINITIONS.

" In this title:

"(1) ADMINISTRATOR.—The term 'Administrator' means the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.

"(2) NATIONAL ACADEMIES.—The term 'National Academies' means the National Academies of Sciences, Engineering, and Medicine.

"(3) PRECIPITATION FREQUENCY ATLAS.—The term 'precipitation frequency atlas' means a geographical atlas, such as the NOAA Atlas 14, that contains precipitation frequency estimates for the United States with associated lower and upper bounds of a determined confidence interval and supplementary information on temporal distribution of heavy precipitation, analysis of seasonality, and trends in annual maximum series data.

"(4) PRECIPITATION FREQUENCY ESTIMATE.—The term 'precipitation frequency estimate' means the magnitude associated with specific average recurrence interval or annual exceedance probability for a given duration.

"(5) UNITED STATES.—The term 'United States' means, collectively, each State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands of the United States, and any other territory or possession of the United States.".

(b) CONFORMING AMENDMENT.—Section 1(b) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501 note) is amended in the table of contents by adding at the end the following:

"TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

"Sec. 601. Study on precipitation estimation.
"Sec. 602. Improving precipitation frequency estimates.
"Sec. 603. Improving probable maximum precipitation estimates.
"Sec. 604. Definitions.".

II. PURPOSE OF THE BILL

This bill directs the National Oceanic and Atmospheric Administration (NOAA) to support a study to understand best practices to support precipitation estimation, to regularly update out-of-date precipitation data in the U.S., and authorizes funding for the study and for the precipitation estimates outlined in this bill.

III. BACKGROUND AND NEED FOR THE LEGISLATION

NOAA provides precipitation estimates in the form of precipitation frequency estimates, commonly known as a precipitation frequency atlas, and probable maximum precipitation estimates, or PMPs. Such precipitation information is useful for local governments, dam safety officials, floodplain managers, and everyday Americans. It is crucial for making life-and-death decisions, like the issuance of evacuation orders, and for long-term decisions, like zoning restrictions or the Federal Emergency Management Agency's flood maps and corresponding flood insurance requirements.

However, much of the precipitation data currently used was last updated in the 1960s and 1970s. As climate change impacts precipitation intensity and frequency, updated information is increasingly important. For years, NOAA has lacked the necessary dedicated funding to collect precipitation data and produce precipitation frequency estimates or probable maximum precipitation estimates.

The Providing Research on Estimates of Changes in Precipitation (PRECIP) Act addresses the issue of outdated precipitation data by

directing NOAA to update its precipitation frequency estimates at least every five years and its PMP estimates at least every 10 years (for the continental US). It also ensures that NOAA considers the effects of climate change on precipitation as it develops estimates and engages in best practices as determined by the National Academies of Sciences, Engineering, and Medicine (NASEM). Additionally, this bill authorizes appropriations for NOAA to carry out the directives of the legislation on a regular timeframe to ensure precipitation estimates remain current and useful.

IV. COMMITTEE HEARINGS

Pursuant to House Rule XIII clause 3(c)(6), Committee designates the following hearings as having been used to develop or consider the legislation:

On April 21, 2021, the Subcommittee on the Environment held a hearing titled "Working Towards Climate Equity: The Case for a Federal Climate Service." The purpose of the hearing was to highlight the need for a strengthened Federal role in climate risk information. The hearing showcased the diverse constituencies urging improved investment in and coordination of Federal climate risk information, with a spotlight on local community planners, frontline communities, and adaptation professionals. The hearing was an opportunity to discuss the availability of climate information that impacts local decision-making, such as designing new roads, bridges, and dams, and implementing flood control projects. It also examined the current, fragmented landscape of Federal programs and nonfederal services that translate global climate data and model outputs to decision-relevant information for adaptation and resilience planning. The witnesses included Richard Moss, PhD, Senior Scientist, Pacific Northwest National Laboratory's Joint Global Change Research Institute at the University of Maryland, Chair, Convening Board, SCAN, and Non-resident Fellow, Andlinger Center, Princeton University; Beth Gibbons, Executive Director, American Society of Adaptation Professionals; Jeffrey B. Basara, PhD Director, Kessler Atmospheric and Ecological Field Station, Executive Associate Director, Hydrology and Water Security Program, University of Oklahoma; and Liz Williams Russell, Climate Justice Program Director, Foundation for Louisiana.

During the hearing, Chairwoman Mikie Sherrill discussed H.R. 1437, the PRECIP Act and how it would update nationwide, authoritative precipitation studies, and incorporate future climate risk into the studies, in order to improve local flood mapping, weather prediction, and resilience planning.

Additionally, Chairwoman Sherill questioned NOAA Administrator Spinrad about the importance of having long-term and accurate precipitation data during the September 23, 2021 Subcommittee on the Environment hearing with NOAA Administrator Richard Spinrad titled "Advancing Earth System Science and Stewardship at NOAA."

V. COMMITTEE CONSIDERATION AND VOTES

On February 26, 2021, Chairwoman Sherrill, along with Chairwoman Eddie Bernice Johnson, Representatives Deborah Ross, Bill Pascrell, Charlie Crist, Brian Fitzpatrick, Albio Sires, Gwen Moore,

and Delegate Eleanor Holmes Norton introduced the bill. The bill was referred solely to the House Committee on Science, Space, and Technology.

On November 16, 2021, the full Committee met to consider H.R. 1437. Chairwoman Sherrill offered an amendment in the nature of a substitute that made a few changes to provide further clarity on the activities authorized in the bill and to better align with the Senate companion. The amendment passed by voice vote, and the underlying bill was voice voted out of Committee.

VI. Summary of Major Provisions of the Bill

H.R. 1437 directs the NOAA Administrator to enter into an agreement with the National Academies of Sciences, Engineering, and Medicine to conduct a consensus study on best practices for estimating precipitation. The bill directs NOAA to update its precipitation frequency estimates at least once every five years, and its probable maximum precipitation estimates at least once every ten years. The bill directs NOAA take into account the effects of climate change on such estimates. It also authorizes appropriations from fiscal year 2022 through fiscal year 2027 to carry out the directives of the bill.

VII. Section-by-Section Analysis (by Title and Section)

Sec 1. Short title

Sec 2. Amendment to the Weather Research and Forecasting Innovation Act of 2017

This section amends the Weather Act by adding a Title VI—Improving Federal Precipitation Information

§ 601. Study on Precipitation Estimation

This section directs the NOAA Administrator to enter into an agreement with the National Academies to conduct a consensus study on best practices for estimating precipitation, including probable maximum precipitation estimates, and provide recommendations for improvement. The Academies are directed to produce a report within 24 months after entering into the agreement. This section authorizes appropriations of $1,500,000 to carry out the study.

§ 602. Improving Precipitation Frequency Estimates

This section directs the NOAA Administrator to publish updated frequency estimates for the U.S. along with a precipitation frequency atlas that incorporates assumptions of non-stationarity (no less than) every five years. The Administrator is further directed to develop related data products and make the information publicly accessible and usable. This section also authorizes appropriations of $3,500,000 to carry out this section for each fiscal year (FY) from 2022 through 2030.

§ 603. Improving Probable Maximum Precipitation Estimates

This section directs the NOAA Administrator to update probable maximum precipitation (PMP) estimates for the U.S. that includes assumptions of non-stationarity within 6 years of the completion of the NASEM report, and not less frequently than every 10 years

thereafter. The Administrator is directed to make all PMP studies and related data accessible and usable by the public. The Administrator is also directed to work with partners to conduct precipitation research and develop a National Guidance Document on precipitation estimation methodologies, both informed by the recommendations from the NASEM study. This section authorizes appropriations of $13 million for FY 2022, $14 million for each FY 2023 and FY 2024, and $2 million for each FY 2025 through 2027.

§ 604. Definitions

VIII. Committee Views

In carrying out the activities authorized in the Act, it is the view of the Committee that NOAA should not delay updating the precipitation frequency and PMP estimates while the NASEM study is under way. The Committee views updated precipitation estimates as critical and time-sensitive, and any findings that arise from the study authorized in Section 601 should be incorporated as available and when practicable. The Committee also emphasizes that the frequency at which precipitation estimates are to be updated according to the Act are minimum frequencies and welcomes estimates that are updated on a more frequent basis.

IX. Cost Estimate

Pursuant to clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

X. Congressional Budget Office Cost Estimate

H.R. 1437, PRECIP Act
As ordered reported by the House Committee on Science, Space, and Technology on November 16, 2021

By Fiscal Year, Millions of Dollars	2022	2022-2026	2022-2031
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	*	50	80

Statutory pay-as-you-go procedures apply?	No	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2032?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

* = between zero and $500,000.

H.R. 1437 would direct the National Oceanic and Atmospheric Administration (NOAA) to improve precipitation estimates for the United States. The bill would authorize the appropriation of spe-

cific amounts for each fiscal year through 2030, totaling $80 million, for the following activities:

- $47 million to create unified guidance for federal agencies and private entities on best practices for producing precipitation estimates,
- $31.5 million to produce improved estimates of precipitation frequency and volume, and
- $1.5 million to contract with the National Academy of Sciences to produce a report on current precipitation estimate practices, their shortcomings, and ways they can be improved.

The Infrastructure Investment and Jobs Act (Public Law 117–58) provided NOAA with advance appropriations totaling $492 million over the 2022 to 2026 period for flood mapping and water modeling activities, including modernized studies of precipitation frequency and volume. The authorization of appropriations in H.R. 1437 would be in addition to the funds already provided.

For this estimate, CBO assumes that H.R. 1437 will be enacted near the end of fiscal year 2022. Using historical spending patterns for similar research and activities, CBO estimates that implementing H.R. 1437 would cost $50 million over the 2022–2026 period and $80 million over the 2022–2031 period.

The costs of the legislation, detailed in Table 1, fall within budget function 300 (natural resources and environment).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 1437

	By fiscal year, millions of dollars—											
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2022–2026	2022–2031
Authorization	18	18	17	6	5	5	4	4	3	0	64	80
Estimated Outlays	*	5	9	21	15	11	8	5	4	2	50	80

*= between zero and $500,000.

The CBO staff contact for this estimate is Robert Reese. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

XI. Federal Mandates Statement

H.R. 1437 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee's oversight findings and recommendations are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to House rule XIII clause (3)(c)(4), the goals and objectives of H.R. 1437 are to provide guidance for and fund investment in the research and development activities to improve the accuracy and frequency of precipitation estimates.

XIV. Federal Advisory Committee Statement

H.R. 1437 does not create any advisory committees.

XV. DUPLICATION OF FEDERAL PROGRAMS

Pursuant to clause 3(c)(5) of rule XIII of the Rules of the House of Representatives, the Committee finds that no provision of H.R. 1437 establishes or reauthorizes a program of the federal government known to be duplicative of another federal program, including any program that was included in a report to Congress pursuant to section 21 of Public Law 111–139 or the most recent Catalog of Federal Domestic Assistance.

XVI. EARMARK IDENTIFICATION

Pursuant to clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 1437 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. APPLICABILITY TO THE LEGISLATIVE BRANCH

The Committee finds that H.R. 1437 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVIII. STATEMENT ON PREEMPTION OF STATE, LOCAL, OR TRIBAL LAW

This bill is not intended to preempt any state, local, or tribal law.

XIX. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (new matter is printed in italics and existing law in which no change is proposed is shown in roman):

WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2017

* * * * * * *

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Weather Research and Forecasting Innovation Act of 2017".

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

* * * * * * *

TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

SEC. 601. STUDY ON PRECIPITATION ESTIMATION.

(a) IN GENERAL.—Not later than 90 days after the date of enactment of the PRECIP Act, the Administrator, in consultation with other Federal agencies as appropriate, shall seek to enter an agreement with the National Academies—

(1) to conduct a study on the state of practice and research needs for precipitation estimation, including probable maximum precipitation estimation; and

(2) to submit, not later than 24 months after the date on which such agreement is finalized, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and make publicly available on a website, a report on the results of the study under paragraph (1).

(b) STUDY.—The report under subsection (a) shall include the following:

(1) An examination of the current state of practice for precipitation estimation at scales appropriate for decisionmaker needs, and rationale for further evolution of this field.

(2) An evaluation of best practices for precipitation estimation that are based on the best-available science, include assumptions of non-stationarity, and can be utilized by the user community.

(3) A framework for—

(A) the development of a National Guidance Document for estimating extreme precipitation in future conditions; and

(B) evaluation of the strengths and challenges of the full spectrum of approaches, including for probable maximum precipitation studies.

(4) A description of existing research needs in the field of precipitation estimation in order to modernize current methodologies and incorporate assumptions of non-stationarity.

(5) A description of in-situ, airborne, and space-based observation requirements, that could enhance precipitation estimation and development of models, including an examination of the use of geographic information systems and geospatial technology for integration, analysis, and visualization of precipitation data.

(6) A recommended plan for a Federal research and development program, including specifications for costs, timeframes, and responsible agencies for addressing identified research needs.

(7) An analysis of the respective roles in precipitation estimation of various Federal agencies, academia, State, tribal, territorial, and local governments, and other public and private stakeholders.

(8) Recommendations for data management to promote long-term needs such as enabling retrospective analyses and data discoverability, interoperability, and reuse.

(9) Recommendations for how data and services from the entire enterprise can be best leveraged by the Federal Government.

(10) A description of non-Federal precipitation data, its accessibility by the Federal Government, and ways for National Oceanic and Atmospheric Administration to improve or expand such datasets.

(11) Such other topics as the Administrator or National Academies consider appropriate.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized $1,500,000 to the National Oceanic and Atmospheric Administration to carry out this study.

SEC. 602. IMPROVING PRECIPITATION FREQUENCY ESTIMATES.

(a) IN GENERAL.—The Administrator shall—

(1) not later than 5 years after the date of enactment of this title and not less frequently than every 5 years thereafter, update precipitation frequency estimates for the United States, such that each update includes at least one precipitation frequency atlas that incorporates assumptions of non-stationarity;

(2) develop products targeted at users of this data in support of the mission of the National Oceanic and Atmospheric Administration;

(3) make publicly available, in a searchable, interoperable format, all precipitation frequency estimate studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and that are deemed to be at an appropriate stage of development on an internet website of the National Oceanic and Atmospheric Administration; and

(4) ensure all precipitation frequency estimate data, products, and supporting documentation and metadata are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section $3,500,000 for each of fiscal years 2022 through 2030.

SEC. 603. IMPROVING PROBABLE MAXIMUM PRECIPITATION ESTIMATES.

(a) IN GENERAL.—Not later than 90 days after the date on which the National Academies makes public the report under section 601, the Administrator, in consideration of the report recommendations, shall consult with relevant partners, including users of the data, on the development of a plan to—

(1) not later than 6 years after the completion of the National Academies report under section 601 and not less than every 10 years thereafter, update probable maximum precipitation estimates for the United States, such that each update includes estimates that incorporate assumptions of non-stationarity;

(2) coordinate with partners to conduct research in the field of extreme precipitation estimation, in accordance with the research needs identified by the National Academies report under section 601;

(3) make publicly available, in a searchable, interoperable format, all probable maximum precipitation studies developed

by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and deemed to be at an appropriate state of development on an internet website of the National Oceanic and Atmospheric Administration; and

(4) ensure all probable maximum precipitation estimate data, products, and supporting documentation and metadata developed by the National Oceanic and Atmospheric Administration are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

(b) NATIONAL GUIDANCE DOCUMENT FOR THE DEVELOPMENT OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES.—The Administrator, in collaboration with Federal agencies, State, territorial, tribal and local governments, academia and other partners the Administrator deems appropriate, shall develop a National Guidance Document that—

(1) provides best practices that can be followed by Federal and State regulatory agencies, private meteorological consultants, and other users that perform probable maximum precipitation studies;

(2) considers the recommendations provided in the National Academies study in section 601;

(3) facilitates review of probable maximum precipitation studies by regulatory agencies;

(4) provides confidence in regional and site-specific probable maximum precipitation estimates; and

(5) includes such other topics as the Administrator deems appropriate.

(c) PUBLICATION.—Not later than 2 years after the date on which the National Academies makes public the report under section 601, the Administrator shall make publicly available the National Guidance Document under subsection (b) on an internet website of the National Oceanic and Atmospheric Administration.

(d) UPDATES.—The Administrator shall update the National Guidance Document not less than once every 10 years after the publication of the National Guidance Document under subsection (c) and publish such updates in accordance with such subsection.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section:

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(2) $14,000,000 for fiscal year 2023.
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(4) $2,000,000 for fiscal year 2025.
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SEC. 604. DEFINITIONS.

In this title:

(1) ADMINISTRATOR.—The term "Administrator" means the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.

(2) NATIONAL ACADEMIES.—The term "National Academies" means the National Academies of Sciences, Engineering, and Medicine.

(3) PRECIPITATION FREQUENCY ATLAS.—The term "precipitation frequency atlas" means a geographical atlas, such as the NOAA Atlas 14, that contains precipitation frequency estimates for the United States with associated lower and upper bounds of a determined confidence interval and supplementary information on temporal distribution of heavy precipitation, analysis of seasonality, and trends in annual maximum series data.

(4) PRECIPITATION FREQUENCY ESTIMATE.—The term "precipitation frequency estimate" means the magnitude associated with specific average recurrence interval or annual exceedance probability for a given duration.

(5) UNITED STATES.—The term "United States" means, collectively, each State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands of the United States, and any other territory or possession of the United States.

XX. PROCEEDINGS OF THE FULL COMMITTEE MARKUP

MARKUPS: H.R. 5781, THE NATIONAL WILDLAND FIRE RISK REDUCTION PROGRAM ACT; H.R. 1437, THE PROVIDING RESEARCH AND ESTIMATES OF CHANGES IN PRECIPITATION (PRECIP) ACT; H.R. 5324, THE NOAA WEATHER RADIO MODERNIZATION ACT OF 2021

MARKUP

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

OF THE

HOUSE OF REPRESENTATIVES

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

NOVEMBER 16, 2021

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MIKE GARCIA, California
STEPHANIE I BICE, Oklahoma
YOUNG KIM, California
RANDY FEENSTRA, Iowa
JAKE LaTURNER, Kansas
CARLOS A GIMENEZ, Florida
JAY OBERNOLTE, California
PETER MEIJER, Michigan
JAKE ELLZEY, TEXAS
VACANCY

C O N T E N T S

Tuesday, November 16, 2021

Appendix: Additional Material for the Record

H R. 5781, THE NATIONAL WILDLAND FIRE RISK REDUCTION ACT

H R 5781, THE NATIONAL WILDLAND FIRE RISK REDUCTION ACT—Continued

H.R. 1437, THE PROVIDING RESEARCH AND ESTIMATES OF CHANGES IN PRECIPITATION (PRECIP) ACT

H R 5324, THE NOAA WEATHER RADIO MODERNIZATION ACT OF 2021

H.R. 5781, THE NATIONAL WILDLAND FIRE RISK REDUCTION PROGRAM ACT

H.R. 1437, THE PROVIDING RESEARCH AND ESTIMATES OF CHANGES IN PRECIPITATION (PRECIP) ACT

H.R. 5324, THE NOAA WEATHER RADIO MODERNIZATION ACT OF 2021

TUESDAY, NOVEMBER 16, 2021

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 10:12 a.m., in room 2318 of the Rayburn House Office Building and via Zoom, Hon. Eddie Bernice Johnson [Chairman of the Subcommittee] presiding.

Chairwoman JOHNSON. And good morning to all. The Committee will come to order, and, without objection, the Chair is authorized to declare recess at any time. Pursuant to *Committee Rule 2E* and *House Rule 11,* the Chair announces that she may postpone roll call votes. Today the Committee is meeting virtually. I want to announce a couple of reminders for the Members about the conduct of this meeting. First, Members should keep their video feed on as long as they are present in the meeting. Members are responsible for their own microphones. Please also keep your microphones muted until you are speaking. Finally, if Members have documents they wish to submit to the record, please e-mail them to the Committee Clerk, whose e-mail address was circulated prior to the meeting.

Pursuant to notice, the Committee meets to consider the following measures. H.R. 5781, the *National Wildland Fire Risk Reduction Program Act,* H.R. 1437, the *Providing Research and Estimates of Changes in Precipitation*, as the *PRECIP Act*, and H.R. 5324, the *NOAA Weather Radio Modernization Act of 2021.*

Let me welcome everyone to today's markup of these bills that address critical issues facing our Nation. First we will consider H.R. 5781, the *National Wildland Fire Risk Reduction Program Act.* I want to thank Representative Lofgren for introducing this common-sense bill, and I also want to thank our colleagues, Representative Bonamici, Mr. McNerney, and Mr. Perlmutter, for join-

ing Representative Lofgren in introducing this bill. This bill builds on the strength of our Federal science agencies to better address the growing threat of wildland fires across our country.

Our cutting-edge Federal research and operational programs provide crucial support to the first responders. These first responders are on the front lines, battling the intense wildland fires in what has become a seemingly year-round fire season. H.R. 5781 will strengthen Federal coordination of research and operational efforts across multiple science agencies. The legislation will support a more efficient and effective whole-of-government response to reducing wildland fire risk through Federal coordination and collaboration. This is a good bill, and I am proud to co-sponsor it.

Next we will consider bipartisan legislation introduced by the Environmental Subcommittee Chair, Ms. Sherrill, H.R. 1437, the *PRECIP Act.* I'm proud to co-sponsor this bill, along with Full Committee Ranking Member Lucas, and Environmental Subcommittee Ranking Member Bice. I appreciate Chairwoman Sherrill's leadership on this Committee on issues related to heavy precipitation and flooding. These types of extreme weather events are becoming more intense due to climate change and impacting communities across the country. We saw the effects in Texas during Hurricane Harvey in 2017. And, unfortunately, we saw the deadly effects of heavy precipitation earlier this year due to Hurricane Ida. Despite making landfall on the Gulf Coast, Ida dumped water all the way up to New York City, and left a path of devastation in its wake. NOAA (National Oceanic and Atmospheric Administration) has a responsibility to provide the most accurate and up to date precipitation data. The updates that are authorized in this bill will be critical to preparing our cities and our communities for future extreme weather.

Last, we will consider another bipartisan bill led by the Environmental Subcommittee Ranking Member Bice, and co-sponsored by Chairwoman Sherrill. The *NOAA Weather Radio Modernization Act* would help to upgrade and modernize NOAA Weather Radio (NWR). NOAA Weather Radio provides critical weather information 24 hours a day, 7 days a week. Additionally, NOAA Weather Radio supports the broadcasting of public safety alerts, and warnings for other natural hazards. This bill would provide authorization to update, modernize, and in some cases expand the current NOAA Weather Radio program. This modernization will improve NOAA's current broadcast delivery, and help this critical program better reach underserved communities.

I want to thank the Members for their interest in these bills, and I look forward to a productive markup.

[The prepared statement of Chairwoman Johnson follows]

I want to welcome everyone this morning to our markup of three bills that address critical issues facing our nation

First, we will consider H R 5781, the *National Wildland Fire Risk Reduction Program Act* I want to thank Representative Lofgren for introducing this commonsense bill I also want to thank our colleagues Representatives Bonamici, McNerney, and Perlmutter for joining Representative Lofgren in introducing this bill This bill builds on the strength of our federal science agencies to better address the growing threat of wildland fires across our country Our cutting-edge federal research and operational programs provide crucial support to first-responders These first-responders are on the frontlines battling the intense wildland fires in what has become a seemingly year-round fire season

H R. 5781 will strengthen federal coordination of research and operational efforts across multiple science agencies The legislation will support a more efficient and effective whole-of-government response to reducing wildland fire risk through federal coordination and collaboration This is a good bill, and I am proud to co-sponsor it

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I want to thank Members for their interest in these bills, and I look forward to a productive markup

Chairwoman JOHNSON. I now recognize our Ranking Member, Mr. Lucas, for opening remarks.

Mr. LUCAS. Thank you, Chairwoman Johnson. This morning we're considering three bills, and I wish I could say that all of the bills under consideration were bipartisan, but unfortunately I cannot. Over the last 3 years we've worked together on the Science Committee to produce thoughtful, consensus legislation to advance the competitiveness of the United States, and to address national goals. We'd been deliberate and collaborative in drafting our legislation.

Since I became a Ranking Member, I've made a—it a priority to return this Committee to an atmosphere of mutual respect where we can work together to achieve our shared goals. My friend, Chairwoman Johnson, has been a tremendous partner in this effort, and I think our results speak for themselves. We passed dozens of bipartisan bills on research and development (R&D), conservation, STEM education, advanced technologies. Last year we passed the first comprehensive update of our energy policy in more than a decade. This year we developed landmark R&D bills to double our basic research investments at NSF (National Science Foundation), DOE (Department of Energy), and NIST (National Institute of Standards and Technology).

This kind of valuable legislation doesn't always make the most headlines, but it makes a real difference. We're able to do this because we don't operate like other Committees. And while we may not be able to reconcile our differences on every bill that we consider, we aren't trying to score political points against each other. Two of the three bills on the agenda today are truly bipartisan Committee products that have been through our usual collaborative process, with Committee staff working across the aisle, and along-

side all Members of this Committee to develop good proposals. The *PRECIP Act* and the *NOAA Weather Radio Modernization Act* are thoughtful bills, which have been informed by stakeholder feedback, and involve extensive discussions and negotiations between our staff. I'll discuss those bills more when they're brought up for consideration.

Unfortunately, the *National Wildland Fire Risk Reduction Program Act* has not been through that process. Wildfires are a critical issue in the West and Midwest. Members on both sides of the aisle want to be—to do productive work to mitigate their damage, so this could've been a productive and bipartisan bill. Instead, the bill was developed behind closed doors, with little input from Republicans on the Committee. The behind the scenes partisanship on this bill was unnecessary, unprecedented, and counterproductive to a healthy legislative environment at this Committee Instead of working together, Republican staff weren't given the bill draft text until just days before it was introduced. We were given little opportunity to provide input, or improve ahead of the time.

So that's why we'll be offering a number of amendments today. The process didn't have to be this way. Wildfires know no political boundaries. I can't think of a more pressing issue for Members in the West. I would've thought an issue that—like this could rise above politics. It would be addressing preventing and reducing wildfires, saving lives and property. For instance, California Representative Mike Garcia has been a leader on this issue on our Committee, a Member with a district deeply impacted by wildland fires, and a prime example of the urban/wildland interface. He introduced a bipartisan bill in August, the *Fire Information and Reaction Enhancement Act,* or the *FIRE Act.* His legislation improves NOAA's wildfire forecasting capacities, and was developed with input from NOAA, and the support of numerous stakeholders. It has bipartisan support, and a number of Democrats have co-sponsored it. It's unfortunate that this bill could not have been incorporated into legislation today, but the gentleman will offer an amendment to do so later in the markup.

Now, I understand that this bipartisanship—partisanship, I should say, is typical for some Committees in Congress, but I believe the Science Committee can, and should, be better than that. Members like serving on the Science Committee because we're the fun Committee, tackling the problems of the future. Let's not lose sight of our Committee's mission to harness innovation to improve the lives of all Americans.

So, that all being said, today's markup is going to take a little longer than it should have. We have a number of Members offering thoughtful, productive amendments to try and improve the underlying legislation. We'll get through today's markup, and then I look forward, hopefully, on moving ahead for the rest of the Congress together to advance science and technology. And with that, Madam Chair, I yield back the balance of my time.

[The prepared statement of Mr. Lucas follows:]

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Over the last three years, we have worked together on the Science Committee to produce thoughtful, consensus legislation to advance the competitiveness of the

United States and address national challenges We have been deliberative and collaborative in drafting our legislation.

Since I became Ranking Member, I've made it a priority to return this Committee to an atmosphere of mutual respect where we can work together to achieve our shared goals My friend Chairwoman Johnson has been a tremendous partner in that effort, and I think our results speak for themselves.

We've passed dozens of bipartisan bills on research and development, conservation, STEM education, and advanced technologies Last year we passed the first comprehensive update of our energy policy in more than a decade. This year we developed landmark R&D bills to double our basic research investments at NSF, DOE, and NIST

This kind of valuable legislation doesn't always make the most headlines, but it does make a real difference We're able to do this because we don't operate like other Committees And while we may not be able to reconcile our differences on every bill we consider, we aren't trying to score political points against each other

Two of the three bills on the agenda today are truly bipartisan committee products that have been through our usual collaborative process, with committee staff working across the aisle and alongside all Members of this Committee to develop good proposals The *PRECIP Act* and the *NOAA Weather Radio Modernization Act* are thoughtful bills, which have been informed by stakeholder feedback and involved extensive discussions and negotiations between our staff I will discuss these bills more when brought up for consideration

Unfortunately, the *National Wildland Fire Risk Reduction Program Act* has not been through that process. Wildfires are a critical issue in the West and Midwest Members on both sides of the aisle want to do productive work to mitigate their damage. So this could have been a productive and bipartisan bill.

Instead, the bill was developed behind closed doors by the Democrats with little to no input from Republicans on the committee The behind-the-scenes partisanship on this bill was unnecessary, unprecedented and counterproductive to a healthy legislative environment at this committee

Instead of working together, Republican staff weren't given the draft bill text until just days before it was introduced We were given little opportunity to provide input or improvements ahead of time So that's why we'll be offering a number of amendments today

The process didn't have to be this way Wildfires know no political boundaries I can't think of a more pressing issue for our Members in the West. I would have thought if any issue could rise above politics, it would be addressing preventing and reducing wildfires and saving lives and property For instance, California Representative Mike Garcia has been a leader on this issue on our Committee A Member with a district deeply impacted by wildland fires and a prime example of the urban-wildland interface, he introduced a bipartisan bill in August the *"Fire Information and Reaction Enhancement Act"* or the *"FIRE Act."*

His legislation improves NOAA's wildfire forecasting capabilities, and was developed with input from NOAA, and with the support of numerous stakeholders It has strong bipartisan support and a number of Democrats have cosponsored it It's unfortunate that his bill could not have been incorporated into this legislation today But the gentleman will offer an amendment to do so later in the markup

I understand that this partisanship is typical for some Committees in Congress, but I believe the Science Committee can and should be better than that Members like serving on the Science Committee because we're the "fun committee", tackling the problems of the future Let's not lose sight of our Committee's mission to harness innovation to improve the lives of all Americans

So that all being said, today's markup is going to take a little longer than it should have. We have a number of members offering thoughtful, productive amendments, to try and improve the underlying legislation We'll get through today's markup, and then I look forward to hopefully moving ahead for the rest of the Congress together to advance science and technology

Thank you, I yield back Madam Chair

Chairwoman JOHNSON. Sorry. Thank you very much for your remarks.

H R. 1437 will be considered. The Clerk will report the amendment—report the bill.

The CLERK. H.R. 1437, a bill to amend the *Weather Research and Forecasting Innovation Act of 2017* to direct the——

[The bill follows:]

I

117TH CONGRESS
1ST SESSION

H. R. 1437

To amend the Weather Research and Forecasting Innovation Act of 2017 to direct the National Oceanic and Atmospheric Administration to provide comprehensive and regularly updated Federal precipitation information, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 26, 2021

Ms. SHERRILL (for herself, Ms. ROSS, Ms. NORTON, Mr. PASCRELL, Ms. JOHNSON of Texas, Mr. CRIST, Mr FITZPATRICK, Mr. SIRES, and Ms. MOORE of Wisconsin) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

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A BILL

To amend the Weather Research and Forecasting Innovation Act of 2017 to direct the National Oceanic and Atmospheric Administration to provide comprehensive and regularly updated Federal precipitation information, 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.

This Act may be cited as the "Providing Research and Estimates of Changes In Precipitation Act" or the "PRECIP Act".

SEC. 2. AMENDMENT TO THE WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2017.

(a) IN GENERAL.—Section 508 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8521) is amended by adding at the end the following:

"TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

"SEC. 601. STUDY ON PRECIPITATION ESTIMATION.

"(a) IN GENERAL.—Not later than 90 days after the date of enactment of the PRECIP Act, the Administrator, in consultation with other Federal agencies as appropriate, shall seek to enter an agreement with the National Academies—

"(1) to conduct a study on the state of practice and research needs for precipitation estimation, including probable maximum precipitation estimation; and

"(2) to submit, not later than 24 months after the date on which such agreement is finalized, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and make publicly available on a website, a report on the results of the study under paragraph (1).

"(b) STUDY.—The report under subsection (a) shall include the following:

"(1) An examination of the current state of practice for precipitation estimation at scales appropriate for decisionmaker needs, and rationale for further evolution of this field.

"(2) An evaluation of best practices for precipitation estimation that are based on the best-available science, include assumptions of non-stationarity, and can be utilized by the user community.

"(3) A framework for—

"(A) the development of a National Guidance Document for estimating extreme precipitation in a changing climate; and

"(B) evaluation of the strengths and challenges of the full spectrum of approaches, including for probable maximum precipitation studies.

"(4) A description of existing research needs in the field of precipitation estimation in order to modernize current methodologies and incorporate the impacts of climate change on precipitation.

"(5) A description of in-situ, airborne, and space-based observation requirements, that could enhance precipitation estimation and development of

models, including an examination of the use of geographic information systems and geospatial technology for integration, analysis, and visualization of precipitation data.

"(6) A recommended plan for a Federal research and development program, including specifications for costs, timeframes, and responsible agencies for addressing identified research needs.

"(7) An analysis of the respective roles in precipitation estimation of various Federal agencies, academia, State, tribal, territorial, and local governments, and other public and private stakeholders.

"(8) Recommendations for data management to promote long-term needs such as enabling retrospective analyses and data discoverability, interoperability, and reuse.

"(9) Recommendations for how data and services from the entire enterprise can be best leveraged by the Federal Government.

"(10) Such other topics as the Administrator or National Academies consider appropriate.

"(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized $1,500,000 to the National Oceanic and Atmospheric Administration to carry out this study

"SEC. 602. IMPROVING PRECIPITATION FREQUENCY ESTIMATES.

"(a) IN GENERAL.—The Administrator shall—

"(1) not later than 5 years after the date of enactment of this title and not less than every 5 years thereafter, update precipitation frequency estimates for the United States, such that each update includes at least one precipitation frequency atlas that incorporates assumptions of non-stationarity;

"(2) develop products targeted at users of this data in support of the mission of the National Oceanic and Atmospheric Administration;

"(3) make publicly available, in a searchable, interoperable format, all precipitation frequency estimate studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and that are deemed to be at an appropriate stage of development on an internet website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all precipitation frequency estimate data, products, and supporting documentation and metadata are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section $3,500,000 for each of fiscal years 2022 through 2030.

"SEC. 603. IMPROVING PROBABLE MAXIMUM PRECIPITATION ESTIMATES.

"(a) IN GENERAL.—Not later than 90 days after the date on which the National Academies makes public the report under section 601, the Administrator, in consideration of the report recommendations, shall consult with relevant partners, including users of the data, on the development of a plan to—

"(1) not later than 6 years after the completion of the National Academies report under section 601 and not less than every 10 years thereafter, update probable maximum precipitation estimates for the United States, such that each update includes estimates that incorporate assumptions of nonstationarity;

"(2) coordinate with partners to conduct research in the field of extreme precipitation estimation, in accordance with the research needs identified by the National Academies report under section 601;

"(3) make publicly available, in a searchable, interoperable format, all probable maximum precipitation studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and deemed to be at an appropriate state of development on an internet website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all probable maximum precipitation estimate data, products, and supporting documentation and metadata developed by the National Oceanic and Atmospheric Administration are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) NATIONAL GUIDANCE DOCUMENT FOR THE DEVELOPMENT OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES.—The Administrator, in collaboration with Federal agencies, State, territorial, tribal and local governments, academia and other partners the Administrator deems appropriate, shall develop a National Guidance Document that—

"(1) provides best practices that can be followed by Federal and State regulatory agencies, private meteorological consultants, and other users that perform probable maximum precipitation studies;

"(2) considers the recommendations provided in the National Academies study in section 601;

"(3) facilitates review of probable maximum precipitation studies by regulatory agencies;

"(4) provides confidence in regional and site-specific probable maximum precipitation estimates; and

"(5) includes such other topics as the Administrator deems appropriate.

"(c) PUBLICATION.—Not later than 2 years after the date on which the National Academies makes public the report under section 601, the Administrator shall make publicly available the National Guidance Document under subsection (b) on an internet website of the National Oceanic and Atmospheric Administration.

"(d) UPDATES.—The Administrator shall update the National Guidance Document not less than once every 10 years after the publication of the National Guidance Document under subsection (c) and publish such updates in accordance with such subsection.

"(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section:

"(1) $13,000,000 for fiscal year 2022.

"(2) $14,000,000 for fiscal year 2023.

"(3) $14,000,000 for fiscal year 2024.

"(4) $2,000,000 for fiscal year 2025.

"(5) $2,000,000 for fiscal year 2026.

"(6) $2,000,000 for fiscal year 2027.

"SEC. 604. DEFINITIONS.

" In this title:

"(1) ADMINISTRATOR.—The term 'Administrator' means the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.

"(2) NATIONAL ACADEMIES.—The term 'National Academies' means the National Academies of Sciences, Engineering, and Medicine.

"(3) PRECIPITATION FREQUENCY ATLAS.—The term 'precipitation frequency atlas' means a geographical atlas, such as the NOAA Atlas 14, that contains precipitation frequency estimates for the United States with associated lower and upper bounds of a determined confidence interval and supplementary information on temporal distribution of heavy precipitation, analysis of seasonality, and trends in annual maximum series data.

"(4) PRECIPITATION FREQUENCY ESTIMATE.—The term 'precipitation frequency estimate' means the magnitude associated with specific average re-

currence interval or annual exceedance probability for a given duration.

"(5) UNITED STATES.—The term 'United States' means, collectively, each State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands of the United States, and any other territory or possession of the United States.".

(b) CONFORMING AMENDMENT.—Section 1(b) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501 note) is amended in the table of contents by adding at the end the following:

○

Chairwoman JOHNSON. Without objection, the bill is considered as read, and open to amendment at any point. Does anyone wish to be recognized to speak on the underlying bill?

Ms. SHERRILL. Madam Chair, I move to strike the last word.

VOICE. Ms. Sherill

Chairwoman JOHNSON. Who was that?

VOICE. Ms. Sherill.

Ms. SHERRILL. Mikie Sherrill.

Chairwoman JOHNSON. Ms. Sherill. You're recognized.

Ms. SHERRILL. Thank you. A couple of months ago Hurricane Ida, which made landfall over 1,000 miles away, caused historic and deadly levels of rainfall and flooding across my district in New Jersey. In fact, according to CDC (Centers for Disease Control and Prevention) estimates, over 35 percent of the deaths related to Hurricane Ida were in New Jersey, the largest share of deaths in any State.

The storm also upended transportation across my State, temporarily shutting down Newark International Airport, with nearly 400 flights canceled, and an entire terminal closed. New Jersey Transit Rail Service was almost entirely suspended, except for the Atlantic City rail line, while buses were delayed across the State as they encountered roads closed by flooding and downed trees.

But it's not just Hurricane Ida. Climate change is causing all storms to rapidly intensify, increasing flood risk, and putting New Jersey further at risk. Extreme weather events like Ida highlight the ever-growing need for improvements in our ability to forecast and predict heavy rainfall and associated flooding We've known the dangers of storms in New Jersey decades, and the data proves they are getting worse as the years go on. Six people were drowned in New Jersey during Hurricane Floyd in 1999, including a resident of Passaic County, which I represent. In 2011 nine people in New Jersey died from Hurricane Irene, most from drowning in the raging flood waters while trapped inside their cars. And at least 40 people from New Jersey died during Superstorm Sandy in 2012. We've got to do better.

We previously heard about the need for improved precipitation data to inform flood maps and management decisions at a Subcommittee hearing I chaired in February 2020 on flood science and flood maps. Much of the precipitation data we have for regions across the U.S. are decades old, and do not account for changes in precipitation frequency and severity due to climate change. NOAA's responsible for updating precipitation frequency estimates and probable maximum precipitation estimates. Updated precipitation data is critical for informing flood risks for flood prone areas.

For my home State of New Jersey, the last major update to the Atlas 14 precipitation data was in 2006, and before that it was in 1977. We cannot afford to wait 30 years between updates. Climate change demands we be more proactive about our data collection, and move from this once in a generation update approach. Based on the resounding need for more up to date accurate precipitation data from many parts of the Nation, I wrote the *Providing Research and Estimates of Change in Precipitation,* or *PRECIP Act.* This bill would mandate NOAA periodically update precipitation

studies for all regions and territories of the U.S. to ensure complete coverage.

As climate change continues to increase the frequency and intensity of flooding events in the U.S , and the number of heavy precipitation events, it's essential that communities in my district, like Little Falls, Woodland Park, and Denville, have the best information possible now and in the future. It's important to note that this bill is not just about numbers and estimates on a spreadsheet inside a government agency. Ensuring this data is accurate and up to date is about health, safety, and well-being in our communities as they confront these ever-increasingly dangerous storms. Unfortunately, as my community knows far too well, this issue can be life or death.

I'm grateful to Chairwoman Johnson, Ranking Member Lucas, Ranking Member Bice, and several other Members of this Committee for co-sponsoring this legislation. I'm also pleased that this bill has bipartisan support in the Senate, where Senator Booker has introduced the companion bill with Senator Wicker. I am also grateful to over a dozen organizations that have expressed their support for this bill. These organizations represent a wide range of stakeholder groups, including scientists, floodplain managers, and engineers. I ask unanimous consent to enter into the record a list of endorsing eight organizations, and a letter of support from the American Geophysical Union.

[See Appendix for the information referred to.]

Chairwoman JOHNSON. Thank you very much. Any requests for time?

Ms. BONAMICI. Madam Chair? Suzanne Bonamici?

VOICE. Ms. Bonamici.

Chairwoman JOHNSON. Ms. Bonamici is recognized.

Ms. BONAMICI. Thank you, Madam Chair. I just want to speak in support of Representative Sherrill's piece of bipartisan legislation. I'm from Oregon, and, of course, people have the understanding that rains a lot in Oregon, however, we just experienced something called an atmospheric river. It was a deluge of rain in so many places in the Pacific Northwest, and in Washington State, just to the north, 170,000 people lost power. On the Pacific Northwest Coast in Oregon, the Coast Guard had to help people evacuate from flooded areas. And the more information, the more data we could get ahead of time, the more accurate the forecast can be, and the more we can do to protect lives and property.

At the same time, we don't have a lot of snow pack, and we're still, in some parts of the State, experiencing drought, which is, of course, related to the climate crisis. But today, thank you to Representative Sherrill, and the co-sponsors of this important legislation, which I strongly support. And thank you again, and I yield back.

Ms. LOFGREN. Would the gentlelady yield?

Ms. BONAMICI. Yes. I yield to——

Ms. LOFGREN. I just wanted to join in thanking Ms. Sherrill You know, California's in a huge drought right now, but what we've discovered is that when it does rain, it simply—it's enormous. These atmospheric rivers, and the flooding that occurs, is really something very different than we have experienced in the past. So this

legislation is very important to the State of California. Even though we're suffering from drought when we see a couple of pieces of water in the air, we wonder what it is, and then we find out it's a flood, so thank you very much for your leadership on this. It's really important.

Ms. BONAMICI. I yield back the—thank you.

Chairwoman JOHNSON. Thank you. The Chair now recognizes Mr. Lucas.

Mr. LUCAS. Thank you, Chairwoman Johnson, and I want to thank the Chairwoman of the Environment Subcommittee, Representative Sherrill, for introducing this legislation, and working with my staff and me to reach a bipartisan product.

In one of our first Committee hearings this 'Congress, we discussed this bill, along with the idea of a Federal Climate Service. I'm pleased to see that my colleagues have heeded my caution against increasing Federal bureaucracy by establishing new services, and instead have focused on what we know works, enabling our established agencies to collect and acquire the data they need to be successful. The *PRECIP Act* does that authorizing NOAA to update its precipitation frequency estimates, begin a National Academies study on precipitation estimate research needs, and develop a plan to update probable maximum precipitation estimates.

This information is absolutely critical to farmers and ranchers of Oklahoma. Both historic data and future estimates of participation—precipitation—it doesn't rain often enough in Oklahoma either on the west side—can inform the agricultural industry of growing season length, plant survival in specific areas, and irrigation needs for the season. These are all necessary to continue providing our country with food security.

Additionally, we cannot forget the value of partnerships between the public and private sectors when it comes to weather data collection. There is no need for NOAA to go out and collect what is already available, and I'm pleased to see this bill considers the value of private sector precipitation information. It seems fitting that public/private partnerships were a prominent feature of my bill, the *Weather Act of 2017,* and the legislation before us today now admits—with a similar message.

I want to thank Chairwoman Sherrill for going through the normal Committee process, and working in a bipartisan manner to accomplish this bill. And I'm proud to co-sponsor it with her, and look forward to its passage. With that, I yield back the balance of my time, Madam Chair.

Chairwoman JOHNSON. Thank you very much. Any other requests for time?

Ms. ROSS. Madam Chair, I move to strike the last word.

VOICE. Ms. Ross.

Chairwoman JOHNSON. Ms. Ross is recognized.

Ms. ROSS. Thank you, Madam Chair, and I also am thrilled to be a co-sponsor of H.R. 1437, the *Protect Communities from Increased Precipitation and Climate Change Act.* This legislation will provide consistent funding for NOAA to update out of date precipitation data.

My home State of North Carolina is particularly susceptible to extreme weather, like hurricanes. Over 350 North Carolinians live

in flood prone areas, and flooding occurs every 7.6 days on average in my State. Inaccurate precipitation data can be the difference between life and death for North Carolinians in flood prone areas. These rainfall standards have also historically been used to regulate and design high hazard potential infrastructure, including dams. Inaccurate or outdated reporting could impact our ability to safely invest in climate resilient infrastructure.

I would like to thank Chairwoman Sherrill for her leadership on this important topic, and I look forward to working with her to see this bill get over the finish line. I urge my colleagues to support this bill, and I yield back

Chairwoman JOHNSON Thank you very much. Any other——

Ms. SHERRILL. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. Clerk will read the amendment.

The CLERK. Amendment Number One, amendment in the nature of a substitute to H.R. 1437, offered by Ms. Sherrill.

[The amendment of Ms. Sherrill follows:]

AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 1437

OFFERED BY M__. _____

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Providing Research and Estimates of Changes In Precipitation Act" or the "PRECIP Act".

SEC. 2. AMENDMENT TO THE WEATHER RESEARCH AND FORECASTING INNOVATION ACT OF 2017.

(a) IN GENERAL.—Section 508 of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8521) is amended by adding at the end the following:

"TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

"SEC. 601. STUDY ON PRECIPITATION ESTIMATION.

"(a) IN GENERAL.—Not later than 90 days after the date of enactment of the PRECIP Act, the Administrator, in consultation with other Federal agencies as appropriate, shall seek to enter an agreement with the National Academies—

"(1) to conduct a study on the state of practice and research needs for precipitation estimation, including probable maximum precipitation estimation; and

"(2) to submit, not later than 24 months after the date on which such agreement is finalized, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and make publicly available on a website, a report on the results of the study under paragraph (1).

"(b) STUDY.—The report under subsection (a) shall include the following:

"(1) An examination of the current state of practice for precipitation estimation at scales appropriate for decisionmaker needs, and rationale for further evolution of this field.

"(2) An evaluation of best practices for precipitation estimation that are based on the best-available science, include assumptions of non-stationarity, and can be utilized by the user community.

"(3) A framework for—

"(A) the development of a National Guidance Document for estimating extreme precipitation in future conditions; and

"(B) evaluation of the strengths and challenges of the full spectrum of approaches, including for probable maximum precipitation studies.

"(4) A description of existing research needs in the field of precipitation estimation in order to modernize current methodologies and incorporate assumptions of non-stationarity

"(5) A description of in-situ, airborne, and space-based observation requirements, that could enhance precipitation estimation and development of models, including an examination of the use of geographic information systems and geospatial technology for integration, analysis, and visualization of precipitation data.

"(6) A recommended plan for a Federal research and development program, including specifications for costs, timeframes, and responsible agencies for addressing identified research needs.

"(7) An analysis of the respective roles in precipitation estimation of various Federal agencies,

academia, State, tribal, territorial, and local governments, and other public and private stakeholders.

"(8) Recommendations for data management to promote long-term needs such as enabling retrospective analyses and data discoverability, interoperability, and reuse.

"(9) Recommendations for how data and services from the entire enterprise can be best leveraged by the Federal Government.

"(10) A description of non-Federal precipitation data, its accessibility by the Federal Government, and ways for National Oceanic and Atmospheric Administration to improve or expand such datasets.

"(11) Such other topics as the Administrator or National Academies consider appropriate.

"(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized $1,500,000 to the National Oceanic and Atmospheric Administration to carry out this study

"SEC. 602. IMPROVING PRECIPITATION FREQUENCY ESTIMATES.

"(a) IN GENERAL.—The Administrator shall—

"(1) not later than 5 years after the date of enactment of this title and not less frequently than every 5 years thereafter, update precipitation frequency estimates for the United States, such that

each update includes at least one precipitation frequency atlas that incorporates assumptions of non-stationarity;

"(2) develop products targeted at users of this data in support of the mission of the National Oceanic and Atmospheric Administration,

"(3) make publicly available, in a searchable, interoperable format, all precipitation frequency estimate studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and that are deemed to be at an appropriate stage of development on an internet website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all precipitation frequency estimate data, products, and supporting documentation and metadata are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section $3,500,000 for each of fiscal years 2022 through 2030.

"SEC. 603. IMPROVING PROBABLE MAXIMUM PRECIPITATION ESTIMATES.

"(a) IN GENERAL.—Not later than 90 days after the date on which the National Academies makes public the report under section 601, the Administrator, in consideration of the report recommendations, shall consult with relevant partners, including users of the data, on the development of a plan to—

"(1) not later than 6 years after the completion of the National Academies report under section 601 and not less than every 10 years thereafter, update probable maximum precipitation estimates for the United States, such that each update includes estimates that incorporate assumptions of nonstationarity;

"(2) coordinate with partners to conduct research in the field of extreme precipitation estimation, in accordance with the research needs identified by the National Academies report under section 601;

"(3) make publicly available, in a searchable, interoperable format, all probable maximum precipitation studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and deemed to be at an appropriate state of development on an inter-

net website of the National Oceanic and Atmospheric Administration; and

"(4) ensure all probable maximum precipitation estimate data, products, and supporting documentation and metadata developed by the National Oceanic and Atmospheric Administration are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

"(b) NATIONAL GUIDANCE DOCUMENT FOR THE DEVELOPMENT OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES.—The Administrator, in collaboration with Federal agencies, State, territorial, tribal and local governments, academia and other partners the Administrator deems appropriate, shall develop a National Guidance Document that—

"(1) provides best practices that can be followed by Federal and State regulatory agencies, private meteorological consultants, and other users that perform probable maximum precipitation studies;

"(2) considers the recommendations provided in the National Academies study in section 601;

"(3) facilitates review of probable maximum precipitation studies by regulatory agencies;

"(4) provides confidence in regional and site-specific probable maximum precipitation estimates; and

"(5) includes such other topics as the Administrator deems appropriate

"(c) PUBLICATION.—Not later than 2 years after the date on which the National Academies makes public the report under section 601, the Administrator shall make publicly available the National Guidance Document under subsection (b) on an internet website of the National Oceanic and Atmospheric Administration.

"(d) UPDATES.—The Administrator shall update the National Guidance Document not less than once every 10 years after the publication of the National Guidance Document under subsection (c) and publish such updates in accordance with such subsection.

"(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Oceanic and Atmospheric Administration to carry out this section

"(1) $13,000,000 for fiscal year 2022.

"(2) $14,000,000 for fiscal year 2023.

"(3) $14,000,000 for fiscal year 2024.

"(4) $2,000,000 for fiscal year 2025

"(5) $2,000,000 for fiscal year 2026

"(6) $2,000,000 for fiscal year 2027

"SEC. 604. DEFINITIONS.

" In this title

"(1) ADMINISTRATOR.—The term 'Administrator' means the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.

"(2) NATIONAL ACADEMIES.—The term 'National Academies' means the National Academies of Sciences, Engineering, and Medicine.

"(3) PRECIPITATION FREQUENCY ATLAS.—The term 'precipitation frequency atlas' means a geographical atlas, such as the NOAA Atlas 14, that contains precipitation frequency estimates for the United States with associated lower and upper bounds of a determined confidence interval and supplementary information on temporal distribution of heavy precipitation, analysis of seasonality, and trends in annual maximum series data.

"(4) PRECIPITATION FREQUENCY ESTIMATE.—The term 'precipitation frequency estimate' means the magnitude associated with specific average recurrence interval or annual exceedance probability for a given duration.

"(5) UNITED STATES.—The term 'United States' means, collectively, each State of the United States, the District of Columbia, the Commonwealth

of Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands of the United States, and any other territory or possession of the United States.".

(b) CONFORMING AMENDMENT.—Section 1(b) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8501 note) is amended in the table of contents by adding at the end the following:

Chairwoman JOHNSON. Ms. Sherrill, you're recognized to explain your amendment.

Ms. SHERRILL. Thank you, Madam Chair. This amendment in the nature of a substitute of the *PRECIP Act* makes a few small changes to provide further clarity on the activities in this bill, and to better align with the Senate companion introduced by my fellow New Jersian Senator Booker, and co-lead by Senator Wicker of Mississippi.

I'm so proud that this bill has bipartisan support in both the House and Senate, and when I look at the House colleagues that have stood up to co-sponsor this bill, I can see that they come from a diverse array of communities from across our country, emphasizing how important the issue of flooding and weather disasters are. I noted Hurricane Ida in my earlier remarks, and how, despite making landfall in Louisiana on August 29, killed 32 people in my State after making its way days later, but what I did not mention was that 28 of those individuals, nearly 88 percent, drowned from floods caused by the increased precipitation. Many of these deaths could, and should've, been prevented with more accurate storm and flood warnings that come further in advance.

I'm sure we all wish we could say that type—this type of destruction and death should be rare, an unexpected anomaly that should only occur once in a century or more. Unfortunately, the data tells us otherwise. Of the top 10 costliest hurricanes to hit the United States, all but one occurred within the last 20 years, and four of those 10 occurred since 2017. Estimated costs of hurricane damage from the past 10 years is over $570 billion, just hurricanes, with much of that damage relating to flooding, and that it's tied to extreme precipitation

So thank you so much. There isn't a Member of this Committee who hasn't heard from their constituents about the effect of disasters like these. For my constituents, in Pequannock, and Fairfield, and Morristown, and Lincoln Park, and Montville, and Verona, and in too many other towns to name in my allotted time, this is a critical and pressing issue. I urge my colleagues to support this amendment, and the underlying bill, and I yield back.

Chairwoman JOHNSON. Thank you very much. Any further discussion on the amendment? We will now vote on the amendment in the nature of a substitute. The vote occurs on the amendment. All those in favor say aye. Those opposed say no. The ayes have it, and the amendment is agreed to.

A reporting quorum now being present, I move that the Committee on Science, Space, and Technology report H.R. 1437——

VOICE. OK. Just let me know

Chairwoman JOHNSON [continuing]. As amended to the House, with the recommendation that it be—the bill be approved. Those in favor of the motion signify by saying aye. Those opposed no. The ayes have it, and the bill is favorably reported.

Without objection, the motion is—to reconsider is laid upon the table. I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered. All Members will have two subsequent calendar days in which to submit supplemental, minority, or additional views on this measure.

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